

From: Roddy, Elizabeth A CIV USN NAVFAC SW SAN CA (USA)
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Sent: Wednesday, April 28, 2021 5:04 PM
To: Praskins, Wayne [Praskins.Wayne@epa.gov]; Juanita.bacey@dtsc.ca.gov; Han,
Terry@CDPH [Terry.Han@cdph.ca.gov]
CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil];
Robinson, Derek J CIV USN NAVFAC SW SAN CA (USA) [derek.j.robinson1@navy.mil];
Liscio, Matthew P CIV USN NAVSEA DET RASO VA (USA) [matthew.liscio@navy.mil]
Subject: N62473-17-D-0006 CTO: N6247318F5065 Parcel G - Soil Data Package TU-108 &
TU-153
Attachments: CTO5065_RSY39Use1_DataPackageRev3_04162021.pdf;
CTO5065_RSY30Use2_DataPackageRev1_04192021.pdf

Dear Wayne, Nina and Terry,

To support the agencies oversight/split sampling effort and as a courtesy of information sharing, attached you will find the Soil Data Package for Parcel G Phase 1 TU-108 and the Soil Data Package for Parcel G Phase 1 TU-153.

Please let me know if you have any questions.

Very Respectfully,

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Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 30 Use 2	Soil Origin: TU153C ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 02/11/2021

Systematic Soil Sample Data: RSY 30 Use 2									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153C-001	1	Systematic	11,515	16,700	0.396	-0.0751	-0.0255	0.0294	-0.0141
HPPG-ESU-TU153C-002	2	Systematic	11,230	16,700	0.476	0.0138	N/A	N/A	N/A
HPPG-ESU-TU153C-003	3	Systematic	11,567	16,700	0.387	-0.0300	N/A	N/A	N/A
HPPG-ESU-TU153C-004	4	Systematic	11,492	16,700	0.345	0.0181	N/A	N/A	N/A
HPPG-ESU-TU153C-005	5	Systematic	11,345	16,700	0.448	-0.00130	N/A	N/A	N/A
HPPG-ESU-TU153C-006	6	Systematic	11,096	16,700	0.515	-0.0138	N/A	N/A	N/A
HPPG-ESU-TU153C-007	7	Systematic	11,394	16,700	0.0727	0.00327	N/A	N/A	N/A
HPPG-ESU-TU153C-008	8	Systematic	11,491	16,700	0.434	-0.0838	N/A	N/A	N/A
HPPG-ESU-TU153C-009	9	Systematic	11,460	16,700	0.354	0.00130	N/A	N/A	N/A
HPPG-ESU-TU153C-010	10	Systematic	11,208	16,700	0.357	0.0281	N/A	N/A	N/A
HPPG-ESU-TU153C-011	11	Systematic	11,235	16,700	0.407	-0.0282	0.0361	0.0186	-0.00186
HPPG-ESU-TU153C-012	12	Systematic	11,152	16,700	0.0664	-0.0597	N/A	N/A	N/A
HPPG-ESU-TU153C-013	13	Systematic	11,364	16,700	0.585	0.0301	N/A	N/A	N/A
HPPG-ESU-TU153C-014	14	Systematic	11,263	16,700	0.486	0.0133	N/A	N/A	N/A
HPPG-ESU-TU153C-015	15	Systematic	11,759	16,700	0.184	-0.0383	N/A	N/A	N/A
HPPG-ESU-TU153C-016	16	Systematic	11,146	16,700	0.325	0.00969	N/A	N/A	N/A
HPPG-ESU-TU153C-017	17	Systematic	11,269	16,700	0.309	0.0155	N/A	N/A	N/A
HPPG-ESU-TU153C-018	18	Systematic	11,025	16,700	0.496	-0.00367	N/A	N/A	N/A
HPPG-ESU-TU153C-019	19	Systematic	11,568	16,700	0.351	-0.0282	N/A	N/A	N/A
HPPG-ESU-TU153C-020	20	Systematic	10,911	16,700	0.404	-0.0150	N/A	N/A	N/A
HPPG-ESU-TU153C-021	21	Systematic	11,110	16,700	-0.017	-0.0275	0.0247	0.0321	0.00210
HPPG-ESU-TU153C-022	22	Systematic	11,243	16,700	0.410	0.0259	N/A	N/A	N/A
HPPG-ESU-TU153C-023	23	Systematic	10,829	16,700	0.346	-0.00225	N/A	N/A	N/A
HPPG-ESU-TU153C-024	24	Systematic	10,889	16,700	0.395	0.0370	N/A	N/A	N/A
HPPG-ESU-TU153C-025	25	Systematic	10,968	16,700	0.557	-0.0606	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Maximum					0.585	0.037	0.0361	0.0021	0.0321
Mean					0.3677	-0.0091	0.0118	-0.0046	0.0267
Median					0.396	-0.0013	0.0247	-0.0019	0.0294
Minimum					-0.017	-0.0838	-0.0255	-0.0141	0.0186
Standard Deviation					0.1436	0.0329	0.0408	N/A	N/A

Biased Soil Sample Data: RSY 30 Use 2									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-ESU-TU153C-B-001	1	Biased	11,611	16,700	0.395	-0.0202	-0.00953	0.0210	0.0218

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10222020-PG-ROV-211	10/22/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10222020-PG-JSS-216	10/22/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10232020-PG-JSS-220	10/23/2020	3x3	10/15/2021	117652
Biased Sample Survey	HPRS-10232020-PG-JSS-221	10/23/2020	3x3	10/15/2021	117652

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 30 Use 2
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 16 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection. Note: this pad was partially full, which is why there is a smaller number of scan data points.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 16 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-29. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 30-65). The systematic soil samples were also analyzed for total strontium as well as for ²³⁵U and ²³⁹Pu by alpha spectroscopy. Total Strontium, ²³⁵U, and ²³⁹Pu results are also included in the TestAmerica sample results report (pages 30-65). Samples HPPG-F-017 and HPPG-F-018 are field duplicates, correlating to systematic samples -007 and -019. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 66-82). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 30 Use 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-153C ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-153.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-30-U2				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	28.06	13.73	13.03	3.84
ROI-06	64.13	129.28	95.43	95.20	9.95
ROI-07	48.12	107.22	73.74	74.14	8.65
ROI-08	85.19	152.31	119.17	118.28	11.34
ROI-10	2,157.46	2,671.66	2,429.44	2,431.71	80.84

Statistical Summary Reference Background

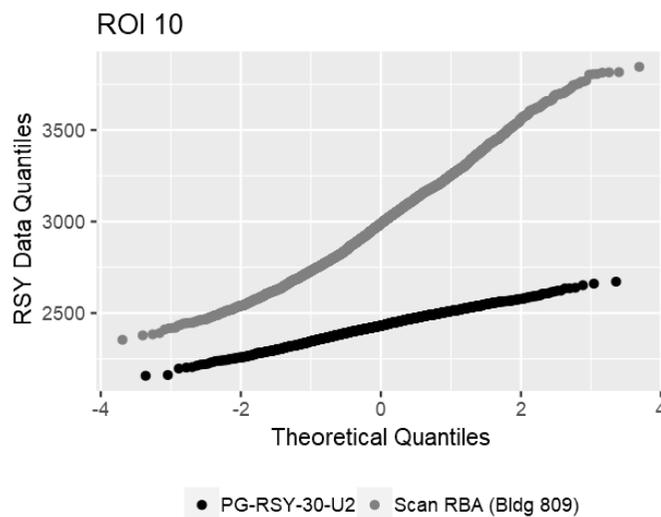
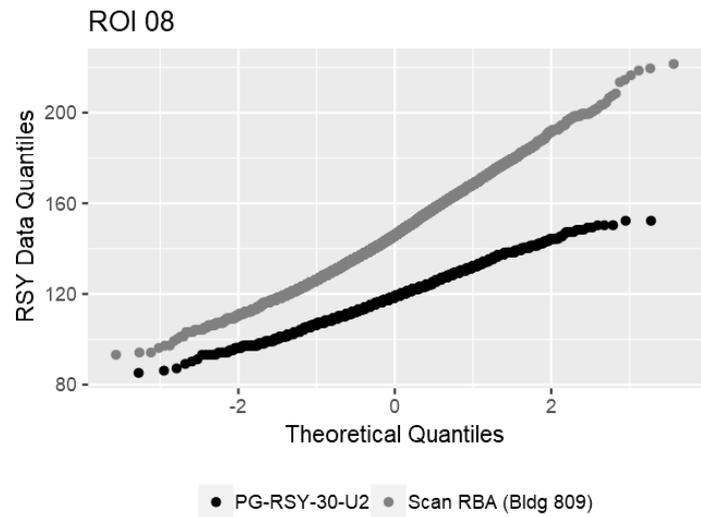
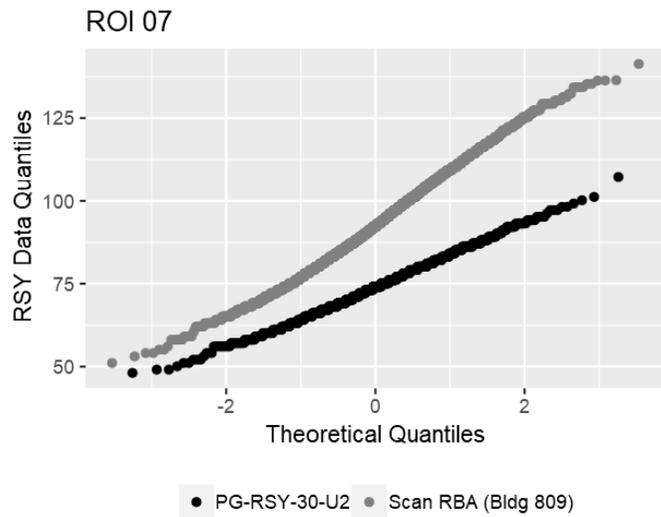
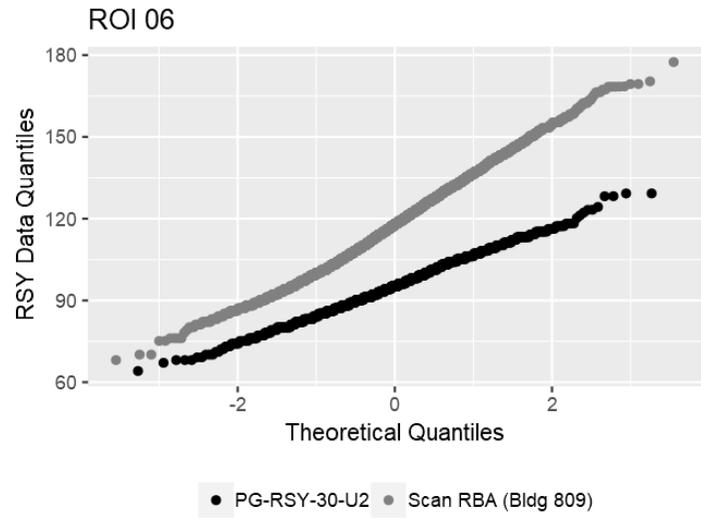
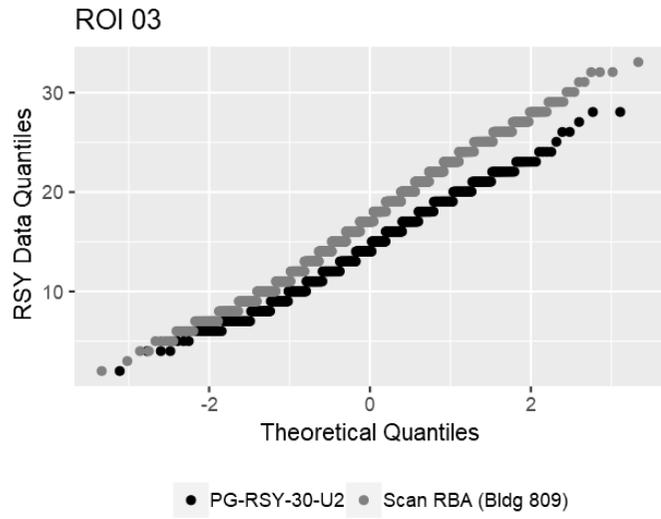
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-30-U2	1310
Scan RBA (Bldg 809)	4632

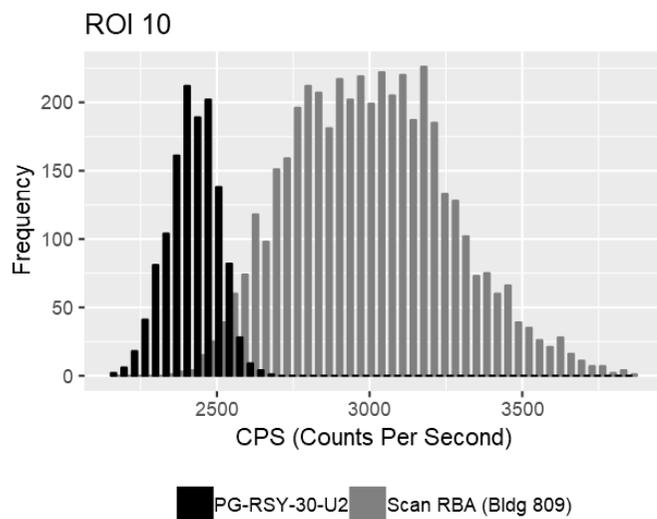
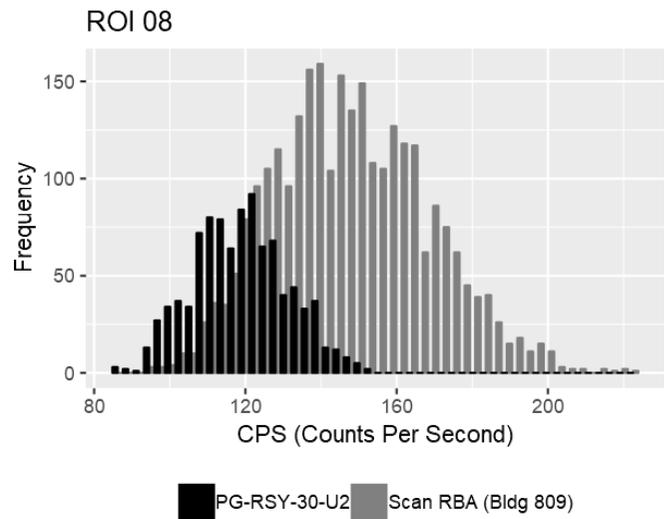
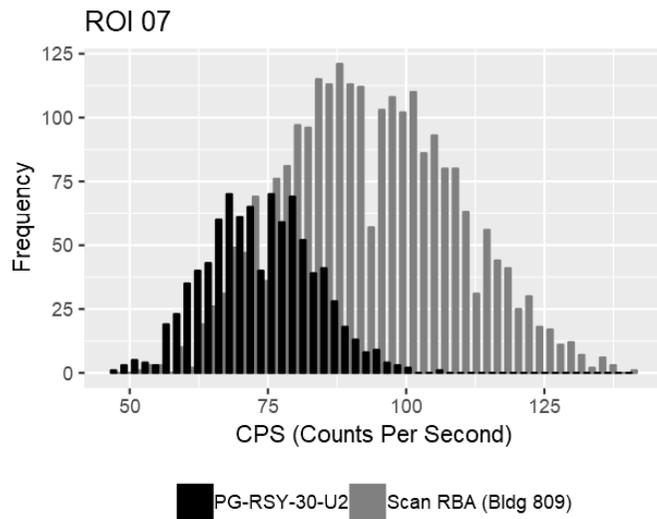
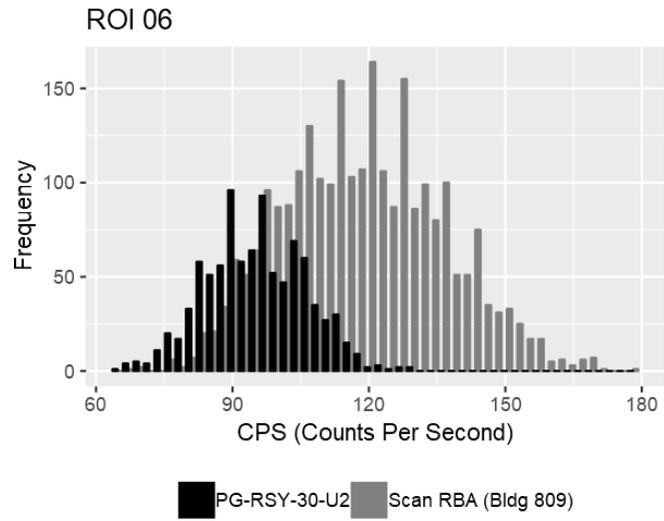
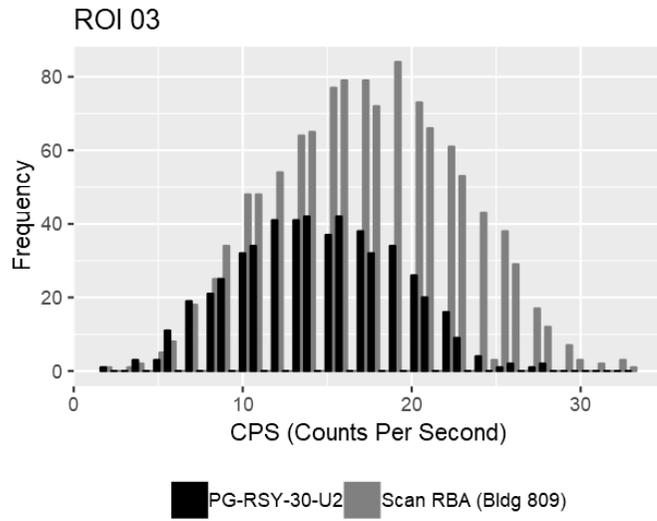
Soil Scan Statistics

Normal Q-Q Plots



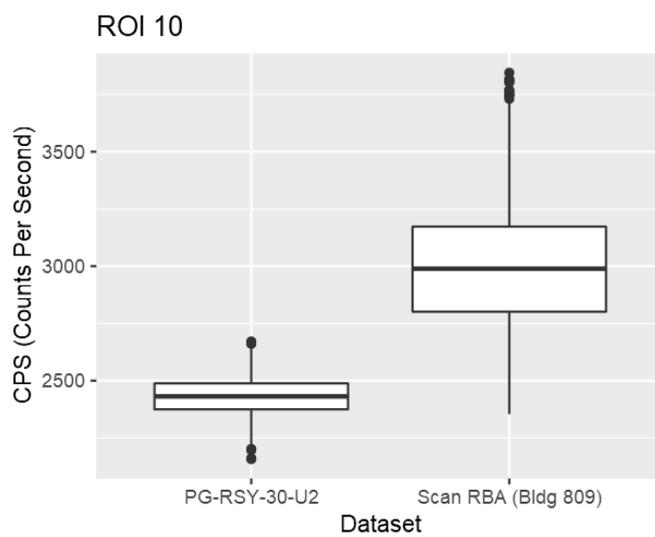
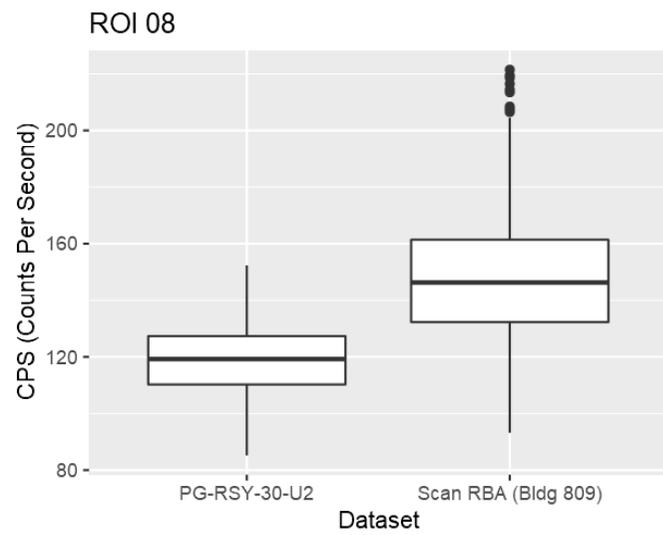
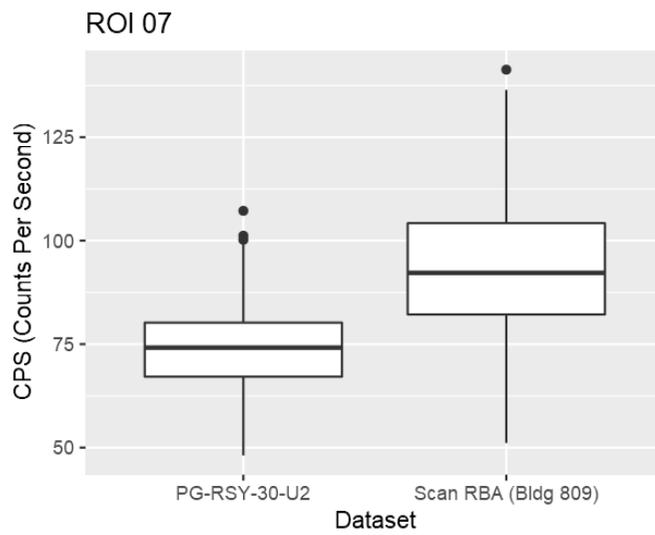
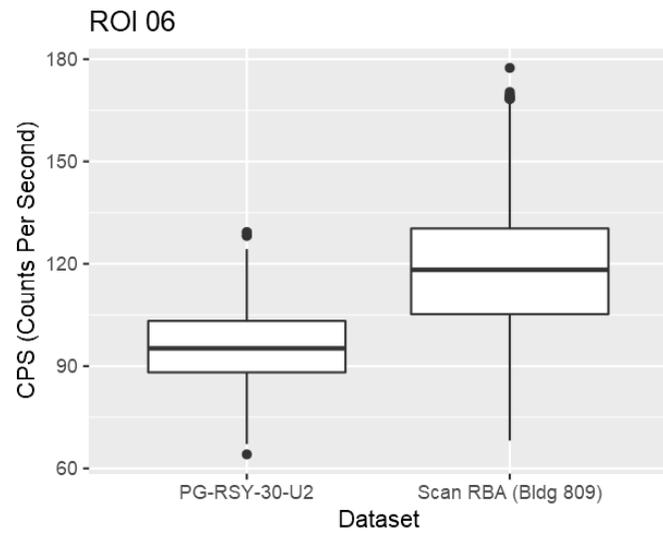
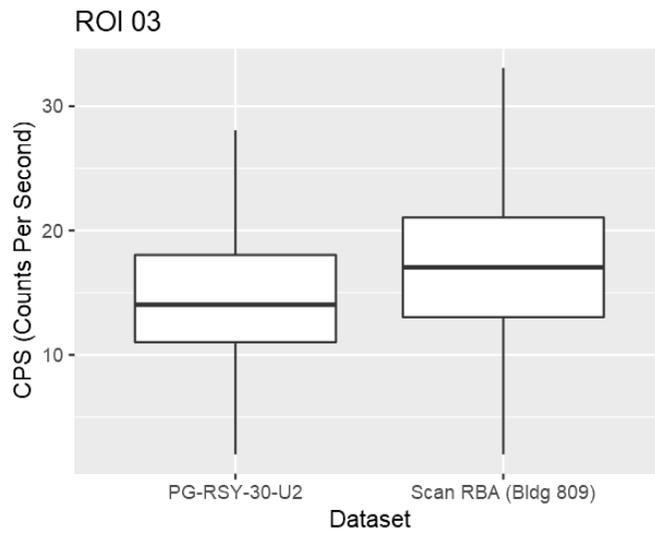
Soil Scan Statistics

Histograms



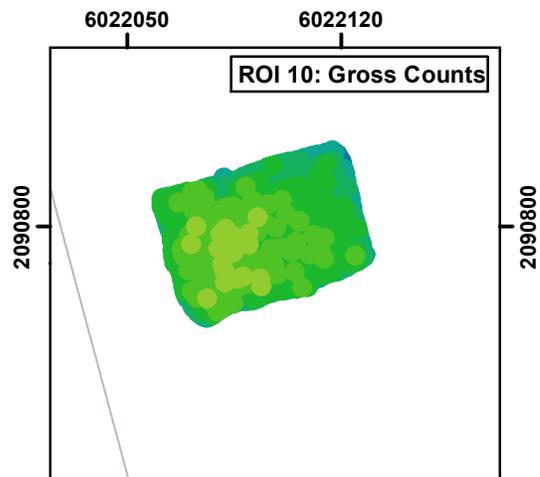
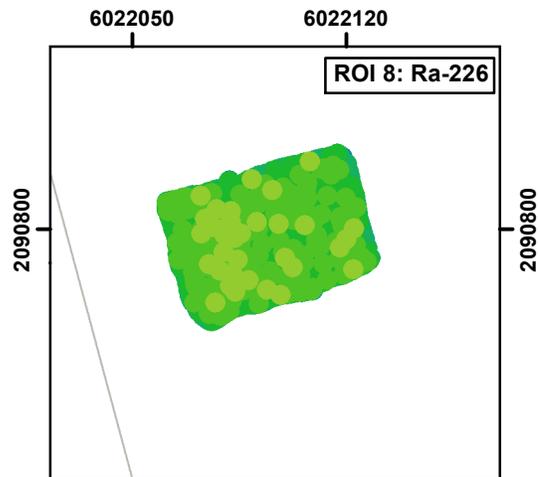
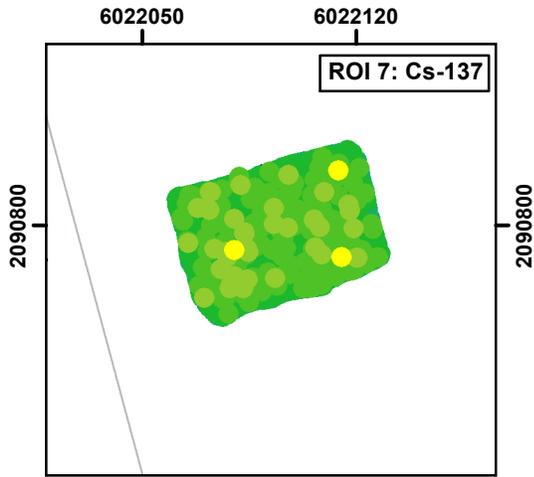
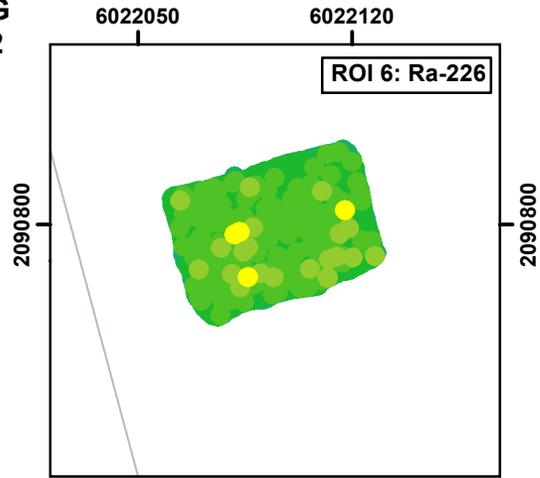
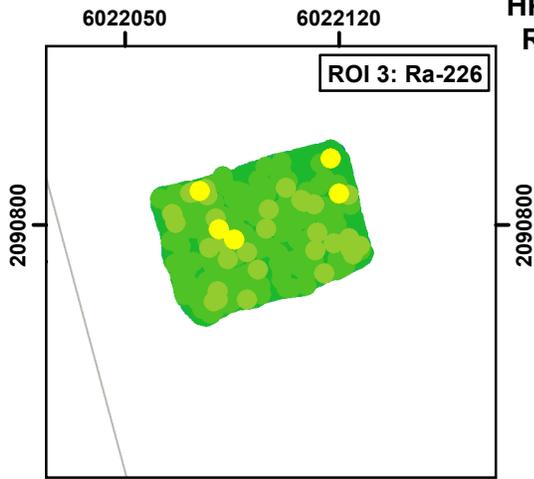
Soil Scan Statistics

Box Plots



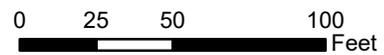
**RSI Data Plots
HPNS Parcel G
RSY 30 Use 2**

TU-153C ESU



RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|--|--|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

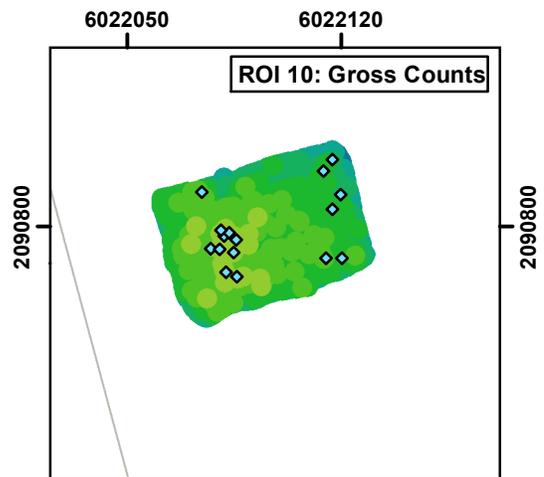
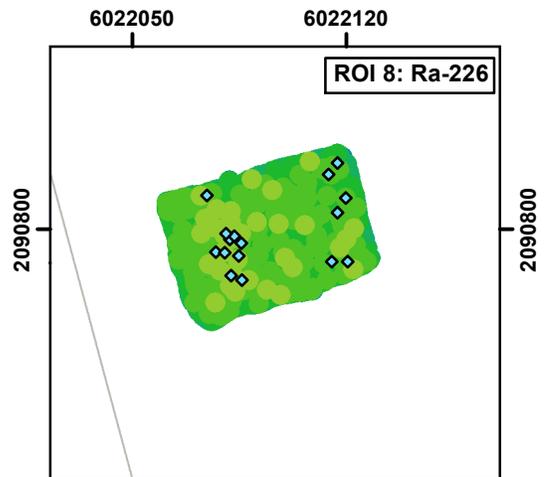
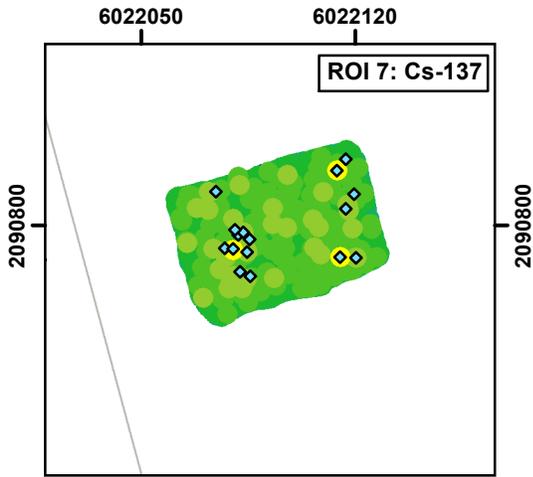
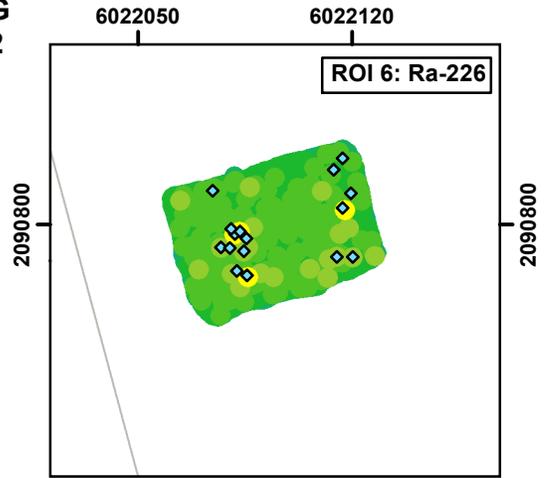
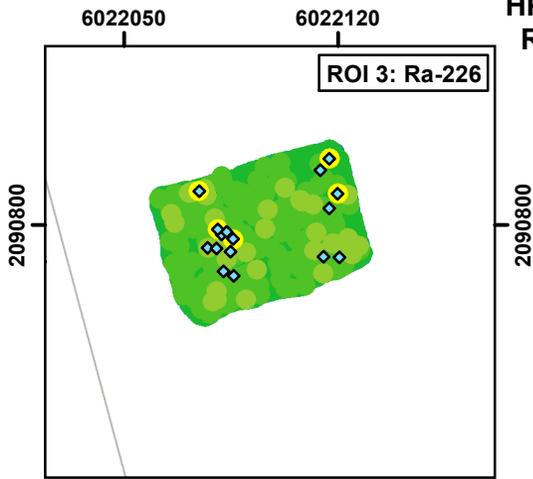


Coordinate system: CSP Zone III, NAD83, US Survey Foot



**RSI Data Plots
HPNS Parcel G
RSY 30 Use 2**

TU-153C ESU



RS 700 Gamma Walkover Survey Data (VD1)

◆ Follow-Up Location	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Follow-Up Static Survey HPNS Parcel G RSY 30 Use 2

TU-153C ESU



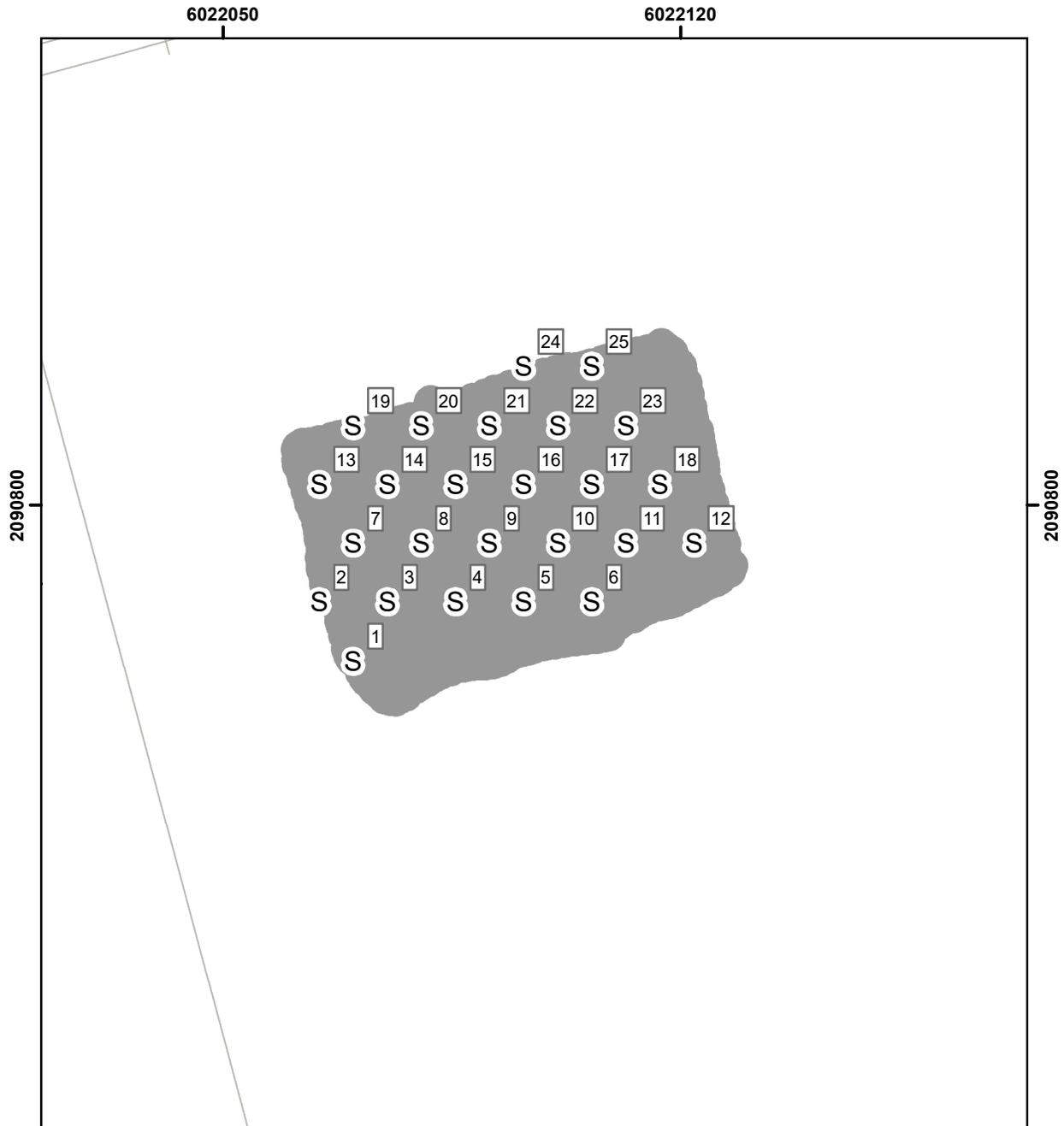
RSY 30 Use 2 (VD1, ROI 10 Gross Gamma)		
◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot

Systematic Sampling HPNS Parcel G RSY 30 Use 2

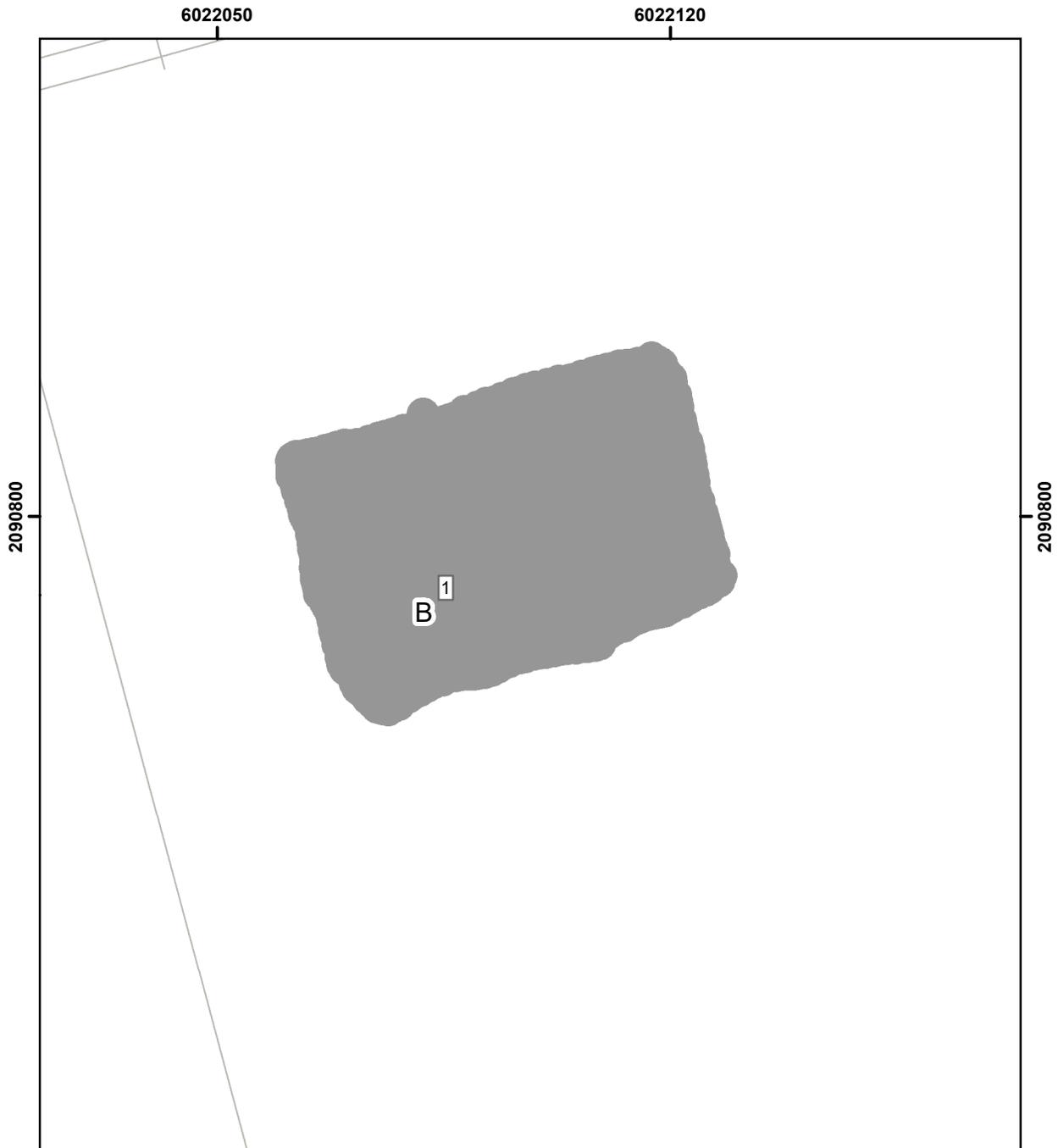
TU-153C ESU



RSY 30 Use 2 S Systematic Sample Locations ● RS-700 GWS Coverage	0 10 20 40 Feet
	Coordinate system: CSP Zone III, NAD83, US Survey Foot

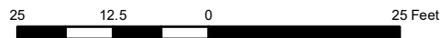
Biased Sampling HPNS Parcel G RSY 30 Use 2

TU-153C ESU



RSY 30 Use 2

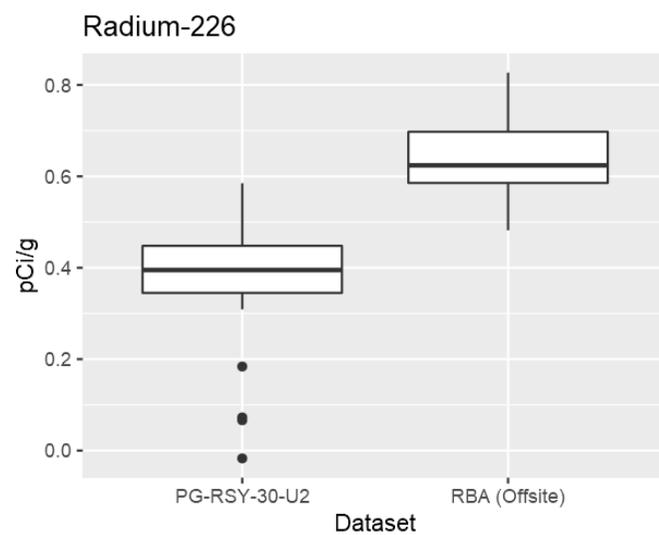
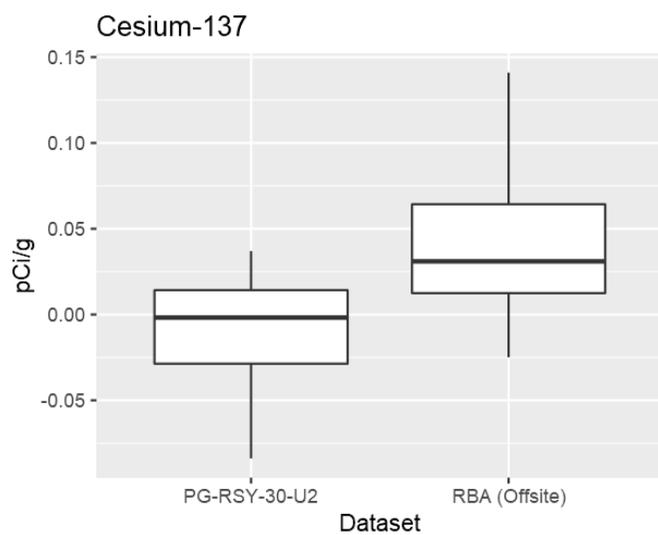
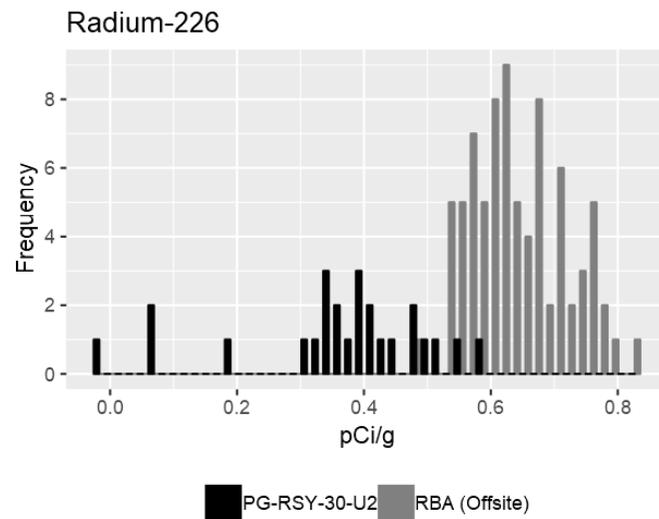
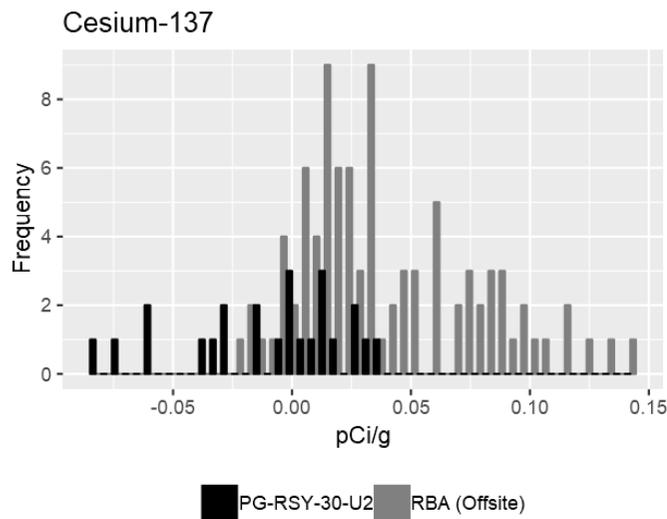
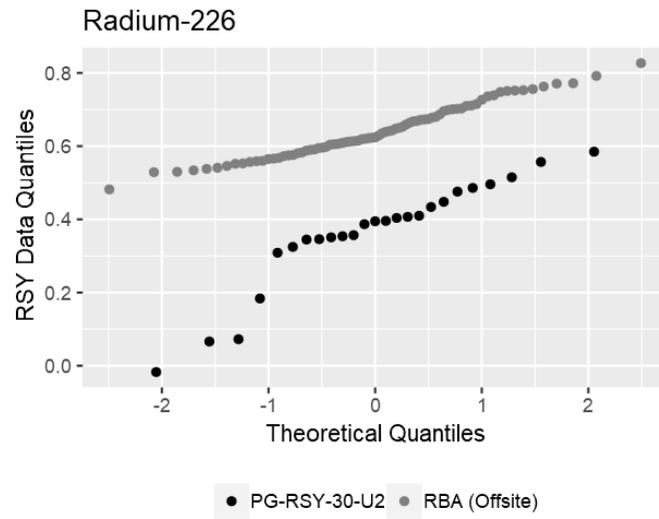
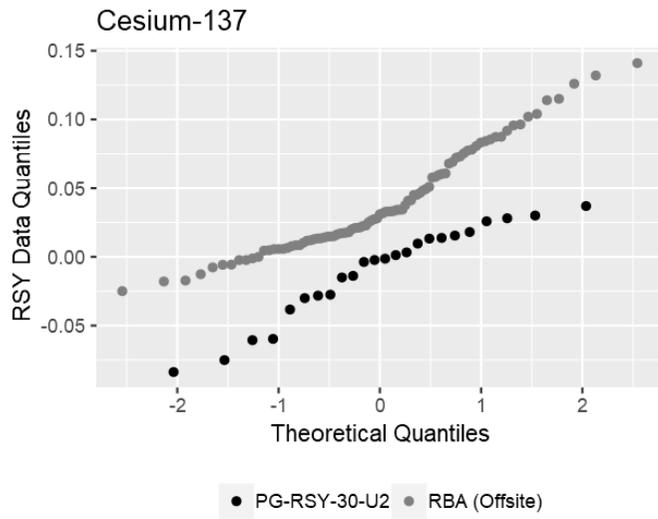
- B** Biased Sample Location
-  RS-700 GWS Coverage



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226** Location: **RSY 30 Use 2**
 LBGR: **0.395 pCi/g**

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	59	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	55	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.59	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	29	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.396	S	0.001	14	14	101	R
0.476	S	0.061	20	20	102.5	R
0.387	S	-0.008	12	12	102.5	R
0.345	S	-0.05	7	7	104	R
0.448	S	0.053	19	19	105	R
0.515	S	0.12	23	23	106	R
0.0727	S	-0.3223	3	3	107	R
0.434	S	0.039	18	18	108	R
0.34	S	-0.041	10	10	109	R
0.357	S	-0.038	11	11	110.5	R
0.407	S	0.012	16	16	110.5	R
0.0664	S	-0.3266	2	2	112	R
0.585	S	0.19	25	25	113	R
0.489	S	0.091	21	21	114	R
0.184	S	-0.211	4	4	115	R
0.325	S	-0.07	6	6	116.5	R
0.309	S	-0.086	5	5	116.5	R
0.465	S	0.101	22	22	118	R
0.351	S	-0.044	9	9	119	R
0.404	S	0.009	15	15	120	R
0.017	S	-0.412	1	1	121	R
0.41	S	0.015	17	17	122	R
0.346	S	-0.049	8	8	123	R
0.395	S	0	13	13	124	R
0.557	S	0.162	24	24	125	R
Sum =			787.6	325		

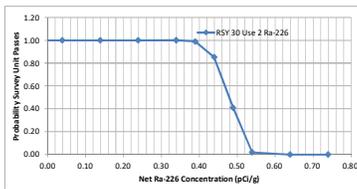
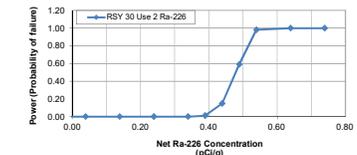
DOGL: **1**
 LBGR = **0.395**
 Median SU Data
 LBGR = **0.395**

Count	SU Stats	m
25	0.149	
0.395		
Median	0.073	
Ref Stats		
Count	100	n
SD	0.073	
Critical Value	1951.9	

Number of Samples	
LBGR	0.395
Δ/c	4.07
Pr	1
N	25.23
N/Z	13
Actual N	25
SU σ	0.149
Z(1-α/2)	2.326
Z(1-β)	1.645

POWER CURVE CALCULATION

Concentration	above Background (C)	(C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.7	-0.16	-3.7	0.00668	0.00074	16.86	229.8282	15.16009	106.18	0.00	1.00	1.00
0.8	-0.06	-3.1	0.01695	0.00289	42.3675	780.5102	27.93761	56.8973	0.00	1.00	1.00
0.9	0.04	-2.4	0.03855	0.00847	96.375	2238.671	47.31459	32.3363	0.00	1.00	1.00
1	0.14	-1.7	0.11467	0.03935	286.665	8310.205	91.16032	14.896	0.00	1.00	1.00
1.1	0.24	-1.0	0.23975	0.11320	599.375	17590.17	132.6279	7.14332	0.00	1.00	1.00
1.2	0.34	-0.4	0.38865	0.22917	971.623	24617.12	156.8964	4.17297	0.00	1.00	1.00
1.25	0.39	0.0	0.50000	0.33333	1250	26249.9	162.0162	2.32292	0.01	0.99	0.99
1.3	0.44	0.3	0.58400	0.42142	1460	25318.47	158.1176	1.04552	0.15	0.85	0.85
1.35	0.49	0.6	0.66431	0.51339	1660.78	22720.64	150.7357	-2.2284	0.59	0.41	0.41
1.4	0.54	1.0	0.76025	0.63370	1900.63	17590.17	132.6279	-2.068	0.98	0.02	0.02
1.5	0.64	1.6	0.87105	0.78860	2177.63	9467.028	97.29865	-5.6658	1.00	0.00	0.00
1.6	0.74	2.3	0.94606	0.90898	2370.16	3247.438	56.98929	-13.052	1.00	0.00	0.00



QUANTILE TEST

From NUREG 1505, Table A.7b Values of r and k for the Quantile Test When α is Approximately 0.025

25 n (number of survey unit measurements)
 100 m (number of reference area measurements)

Use:	
m =	100
n =	25
r	4
k	3
alpha	0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

# of R:	100	n
# of S:	25	m
Avg Rank R:	73.5	
Avg Rank S:	13	

For m or n greater than 20, the critical value (k) can be calculated from

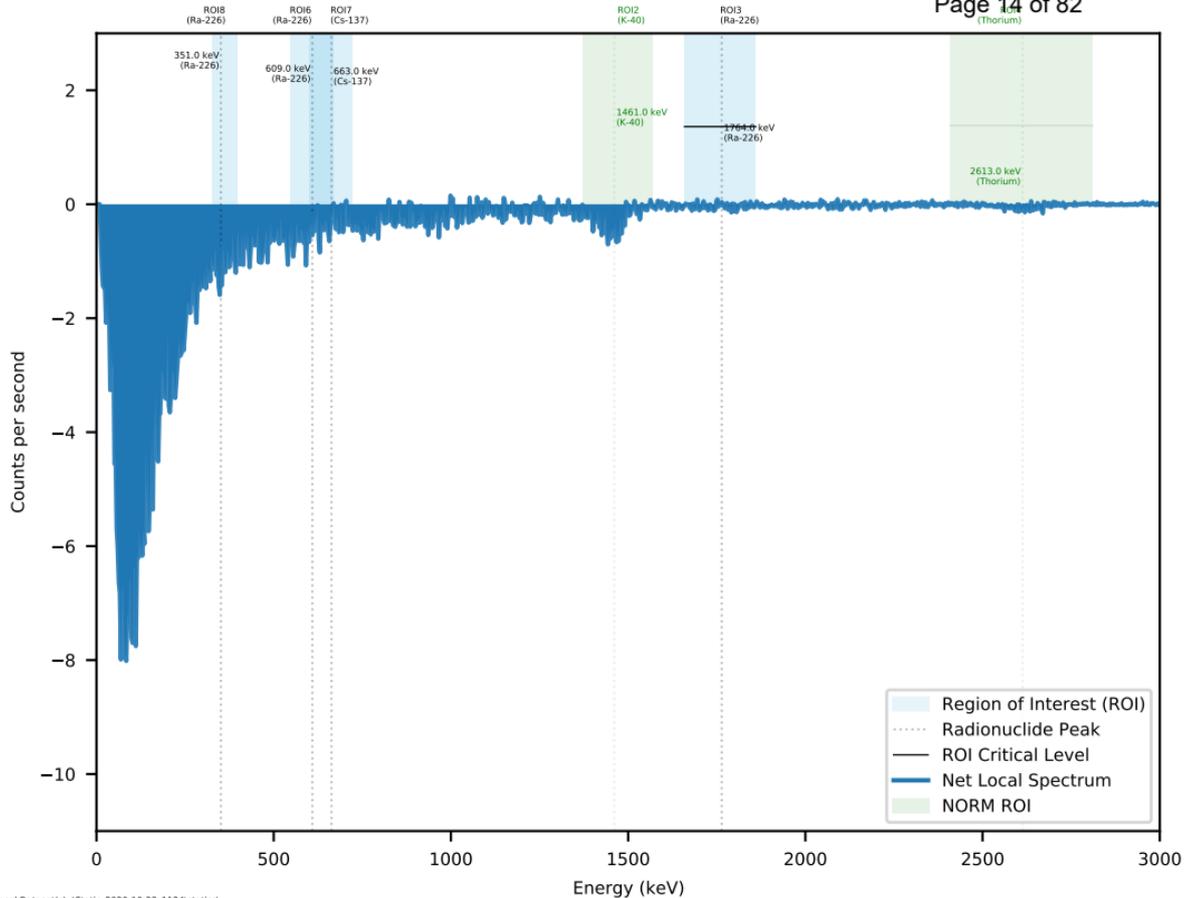
$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

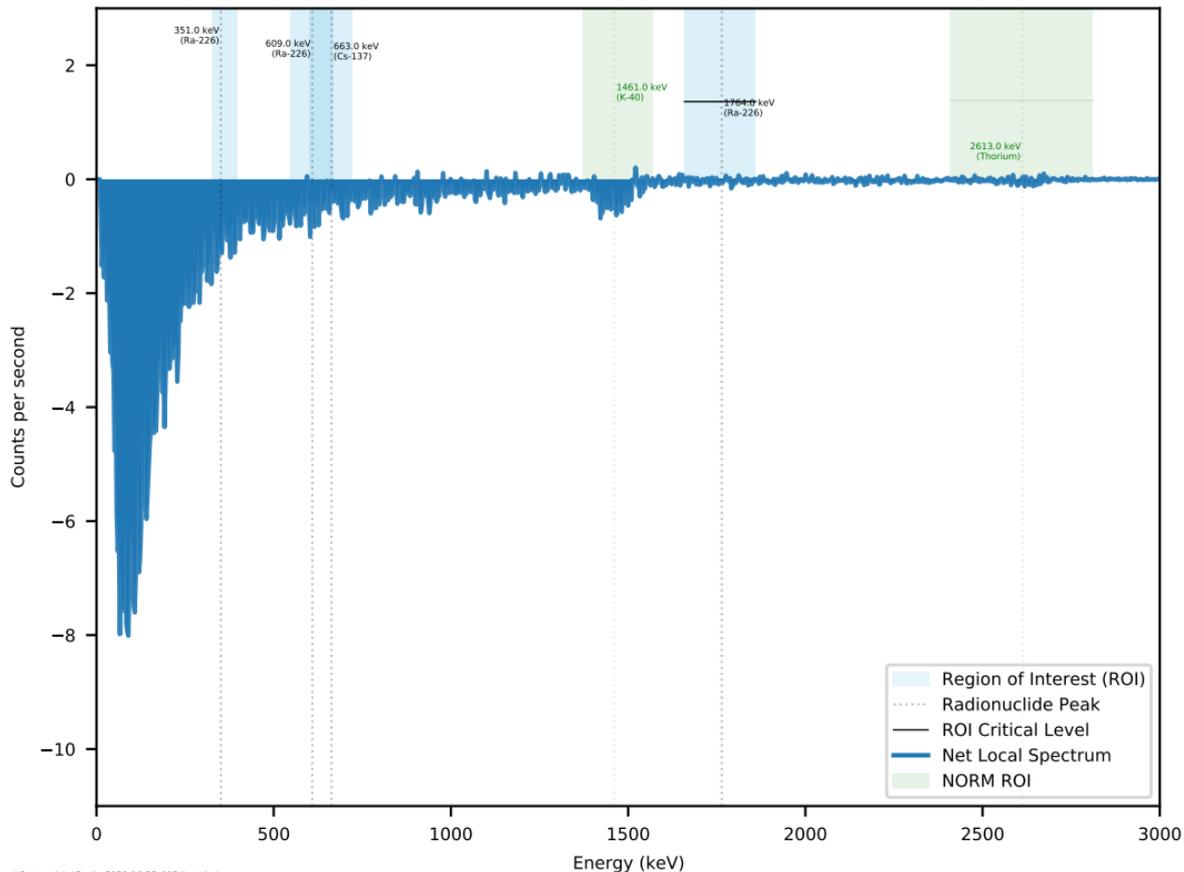
$z = 99.0\%$ percentile of standard normal distribution = 2

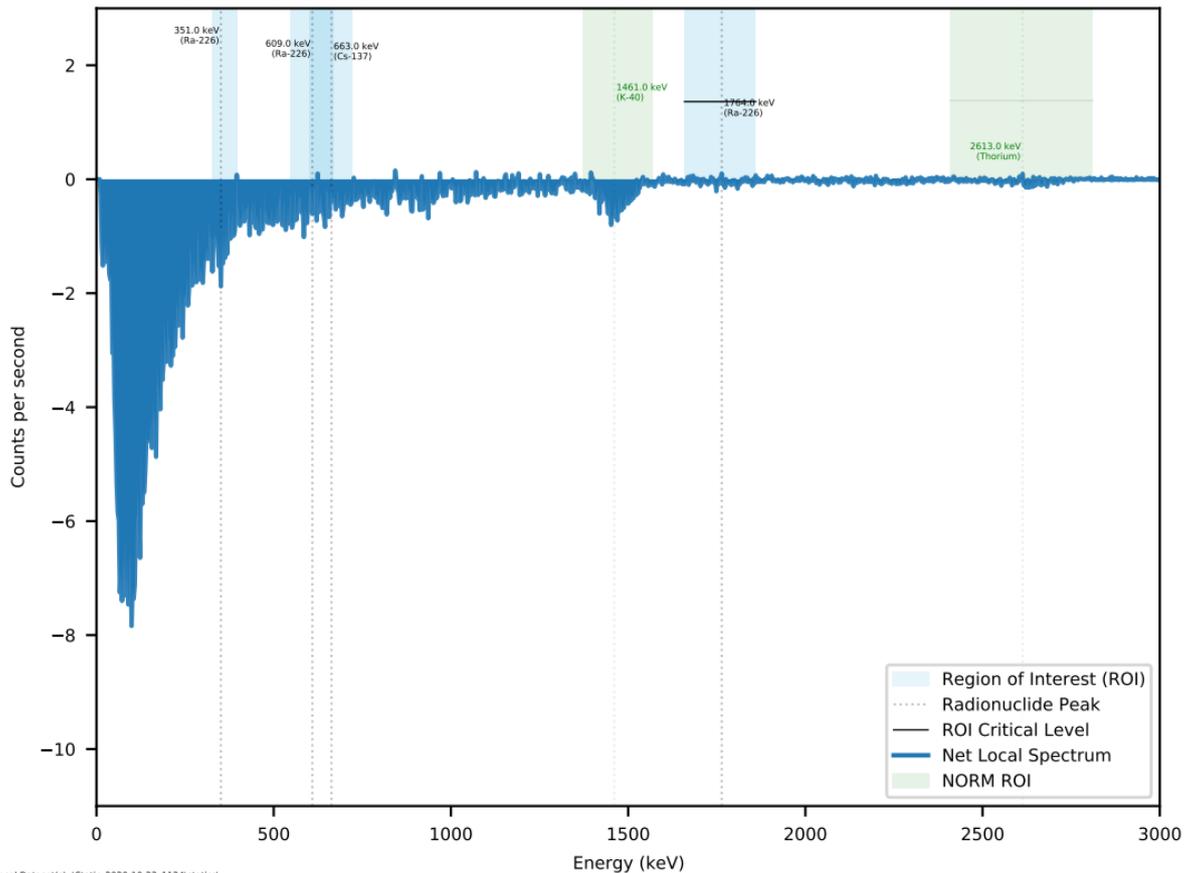
$$k = 1951.9$$

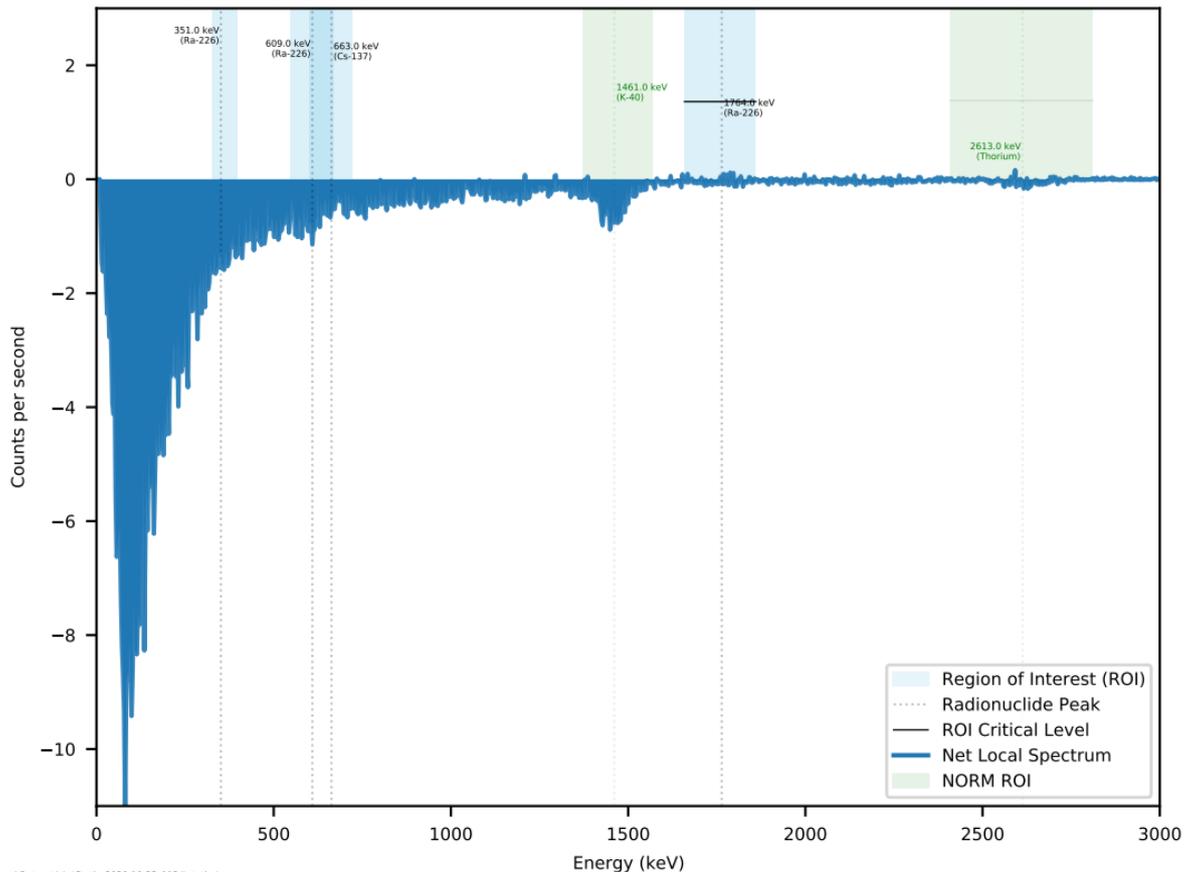
$\alpha = 0.02 = 0.01$
 $\beta = 0.05$

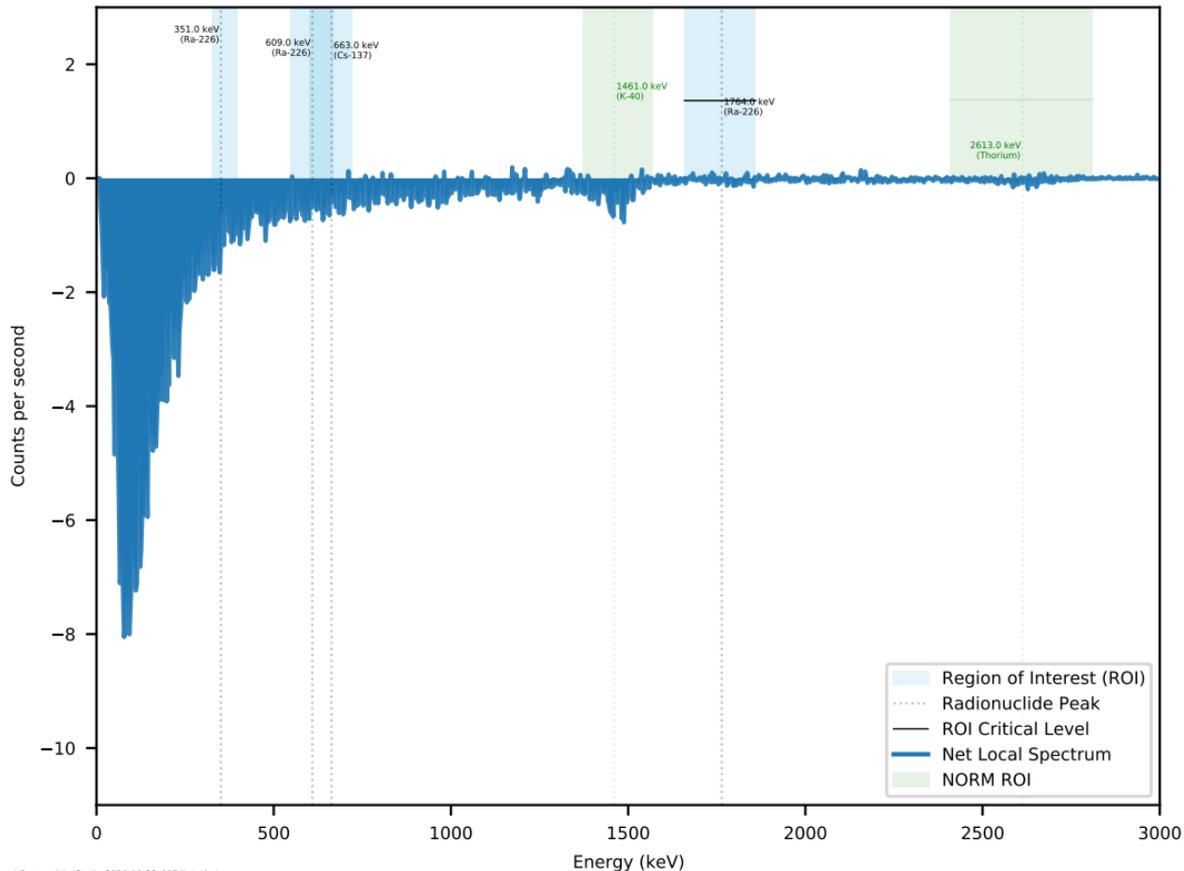
Since the sum of the survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

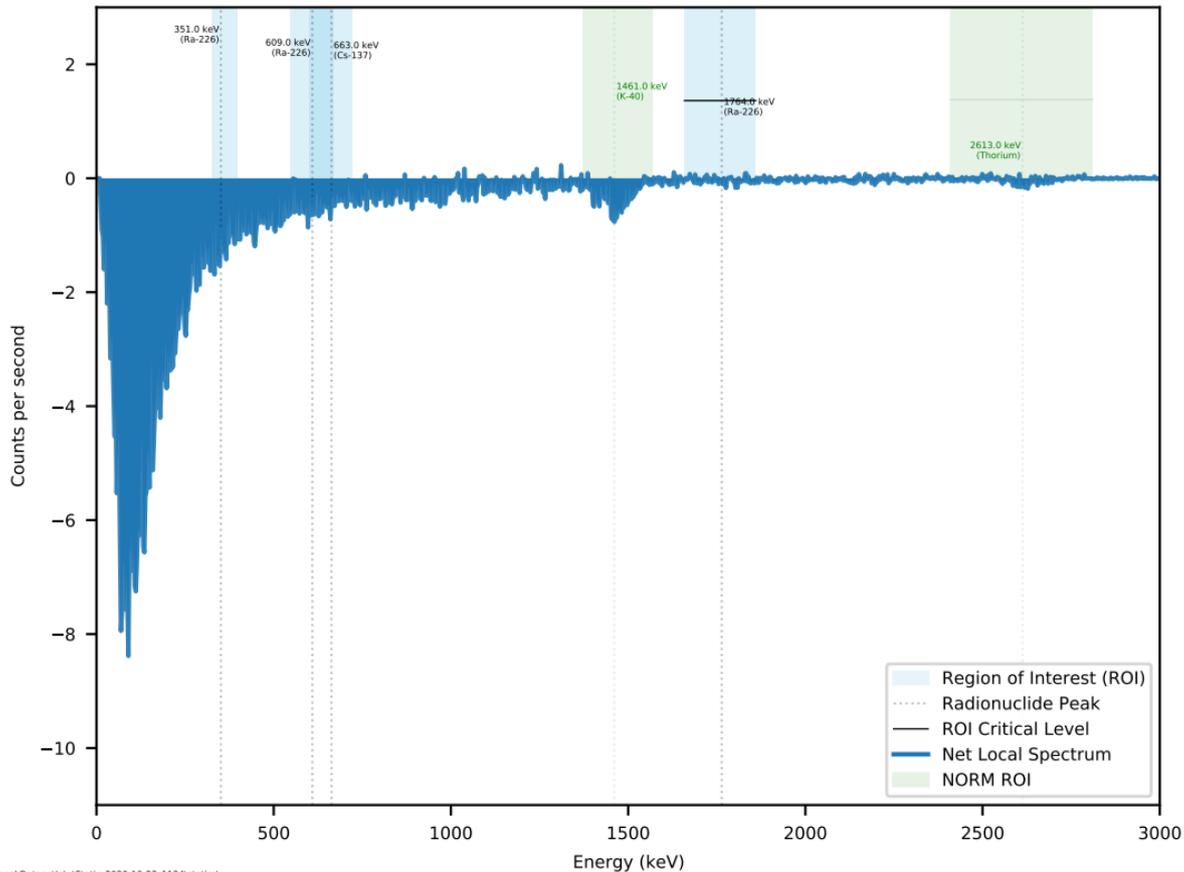


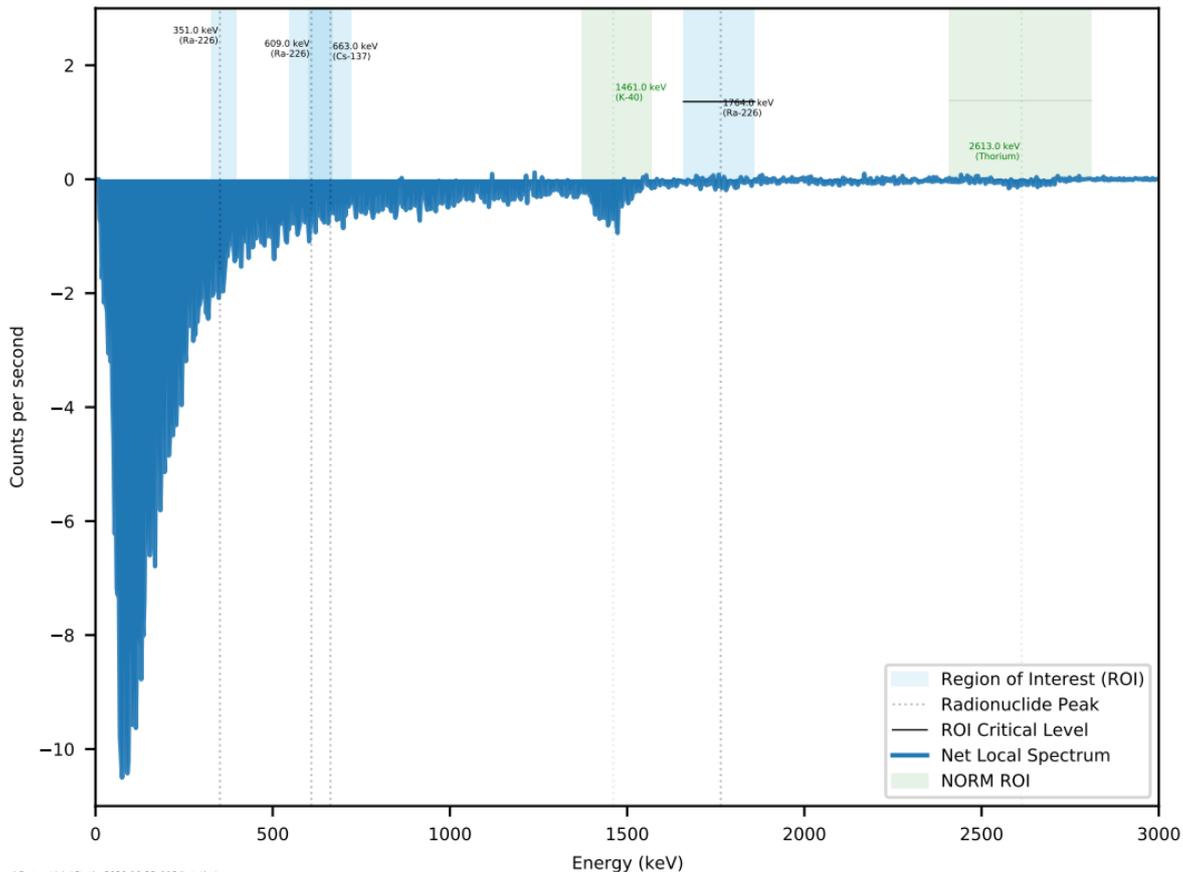


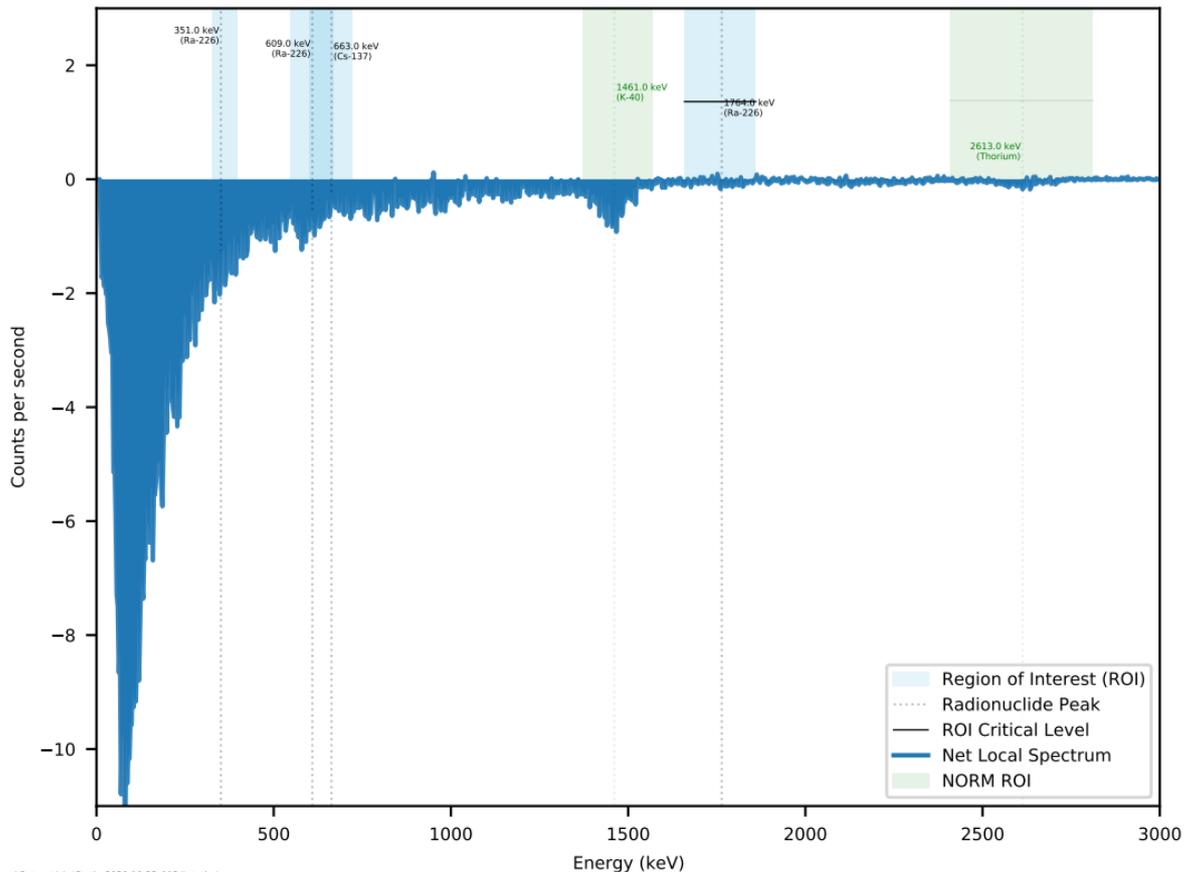


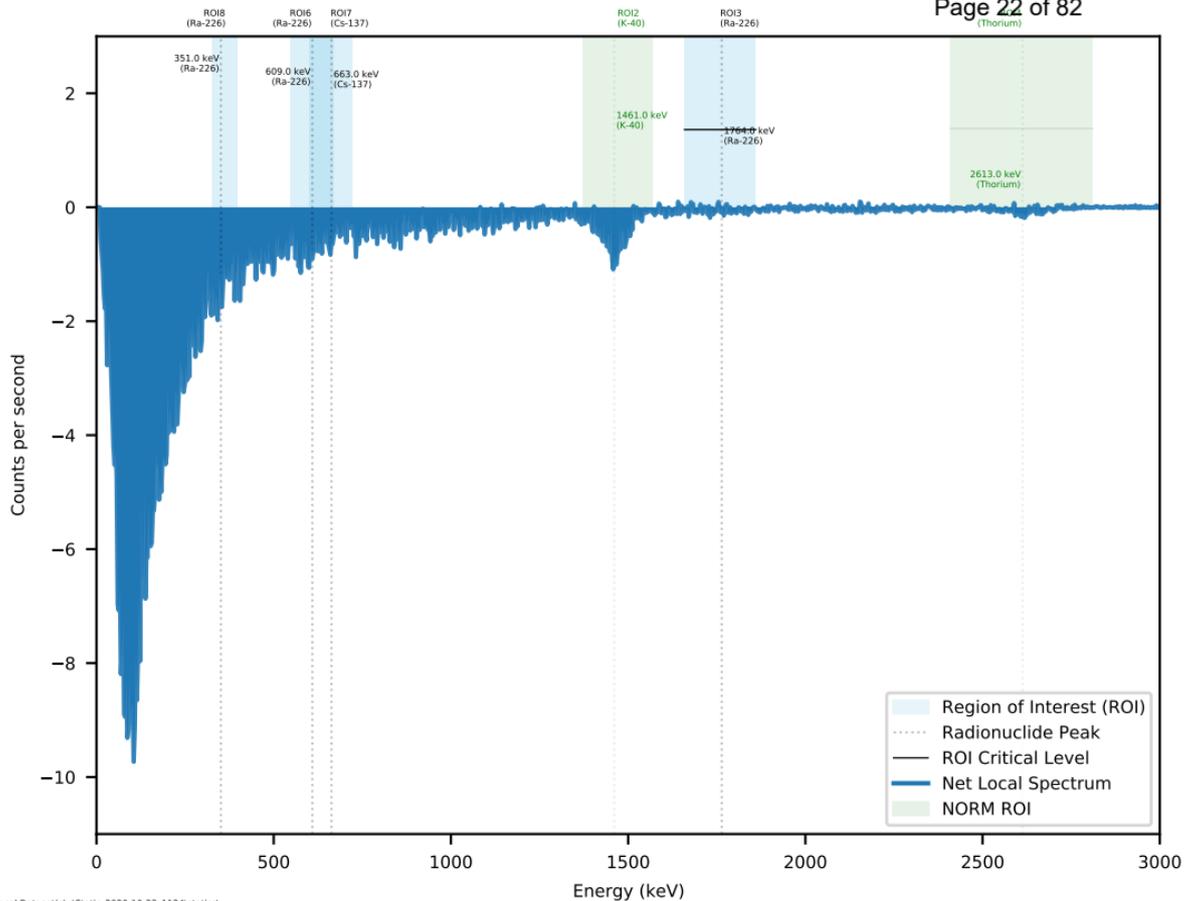


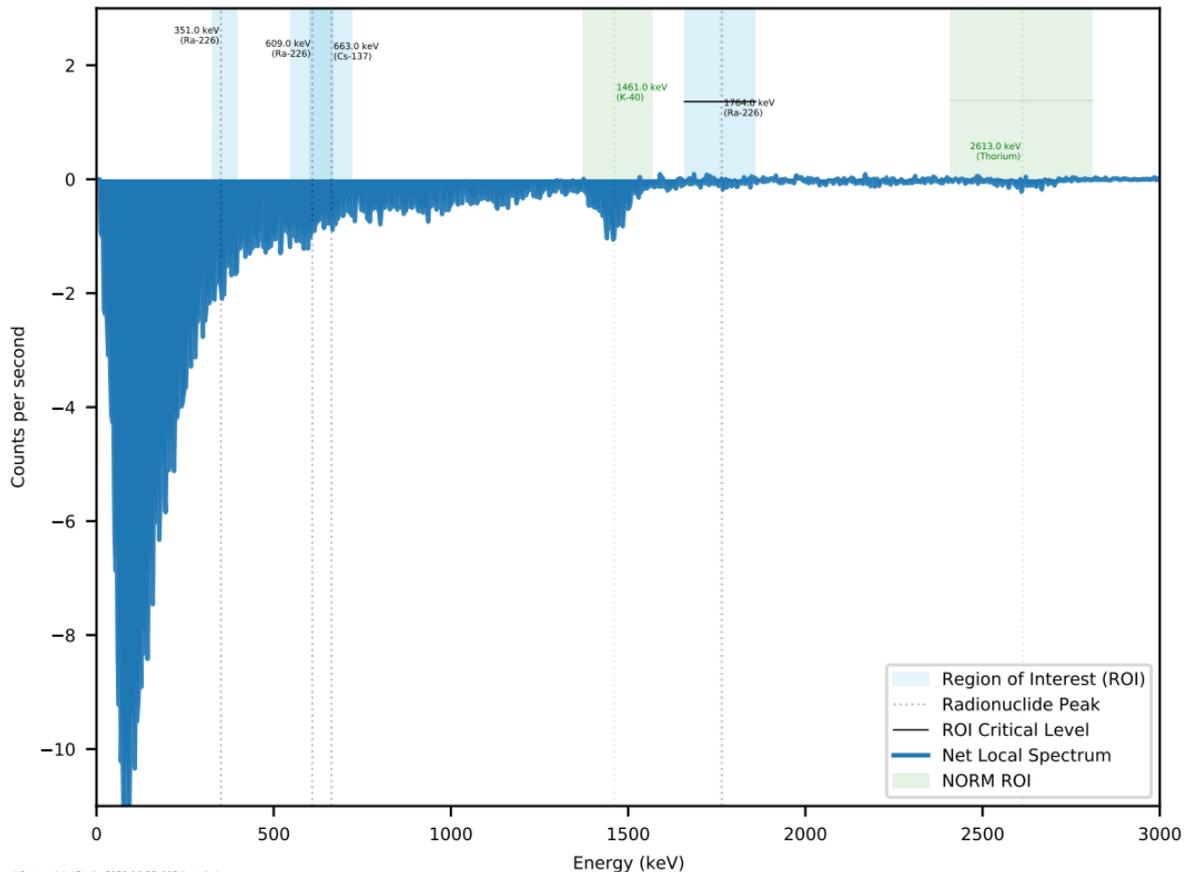


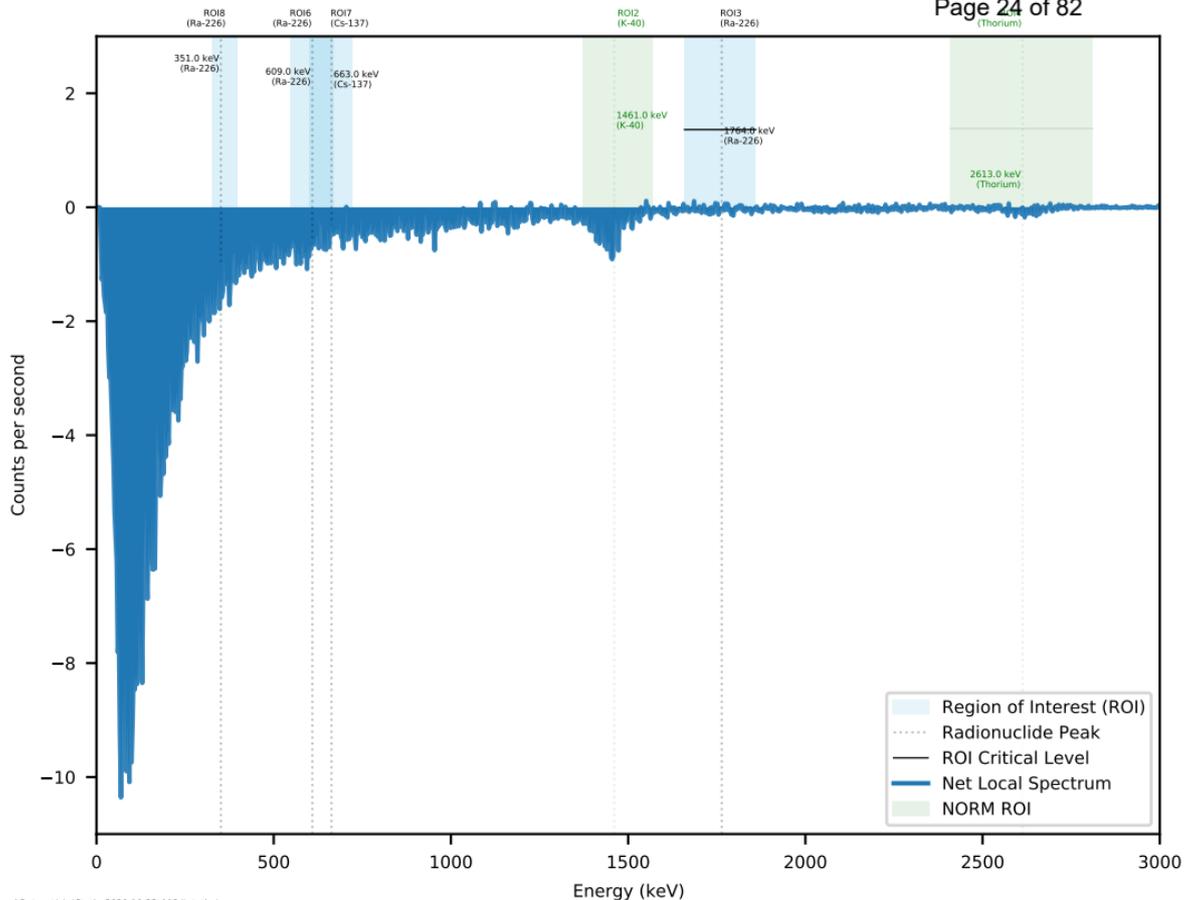


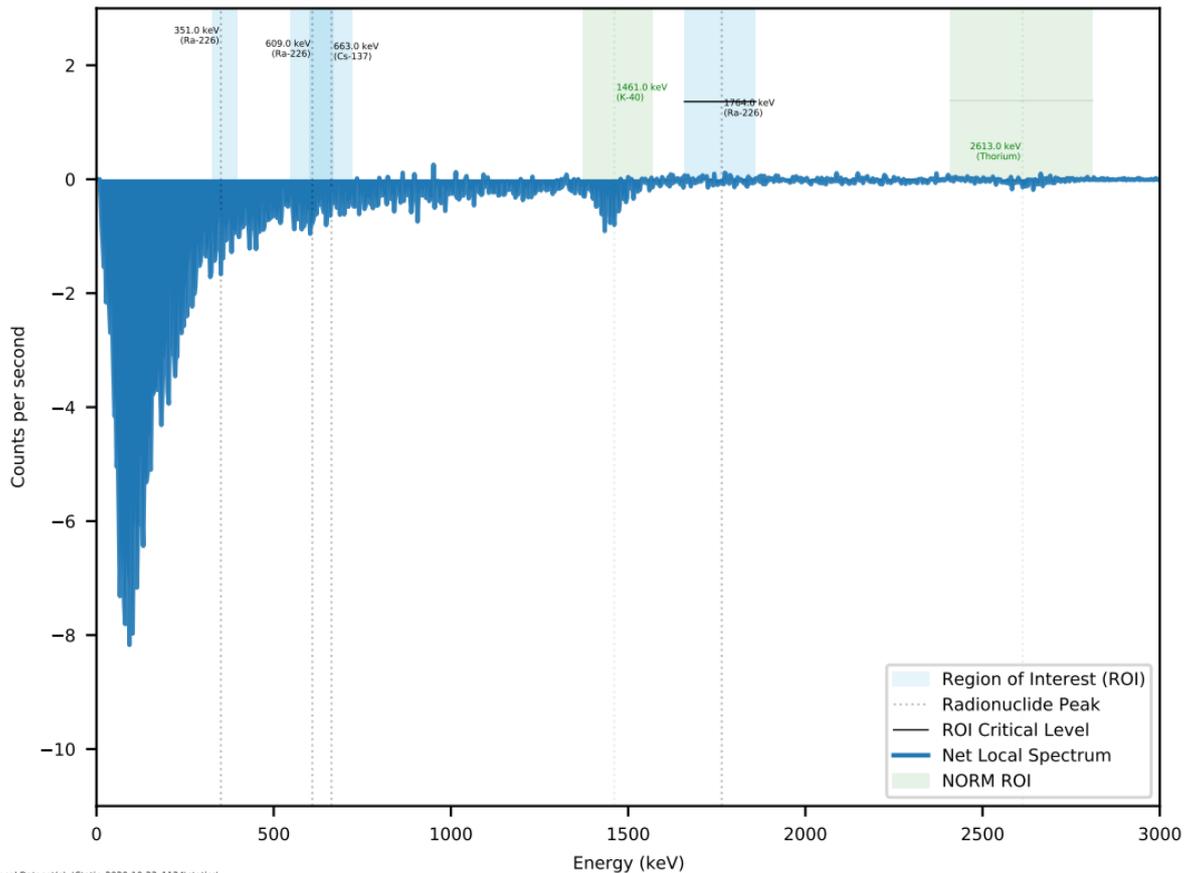


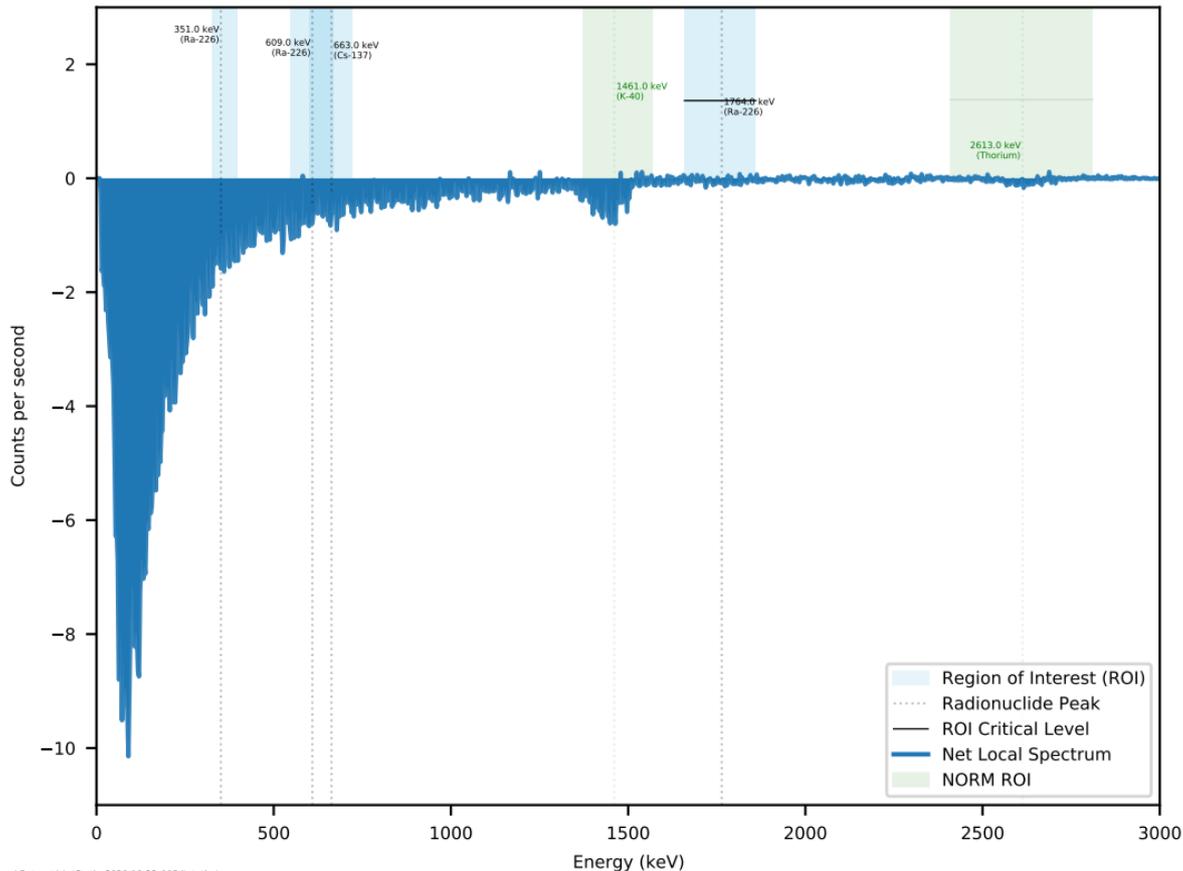


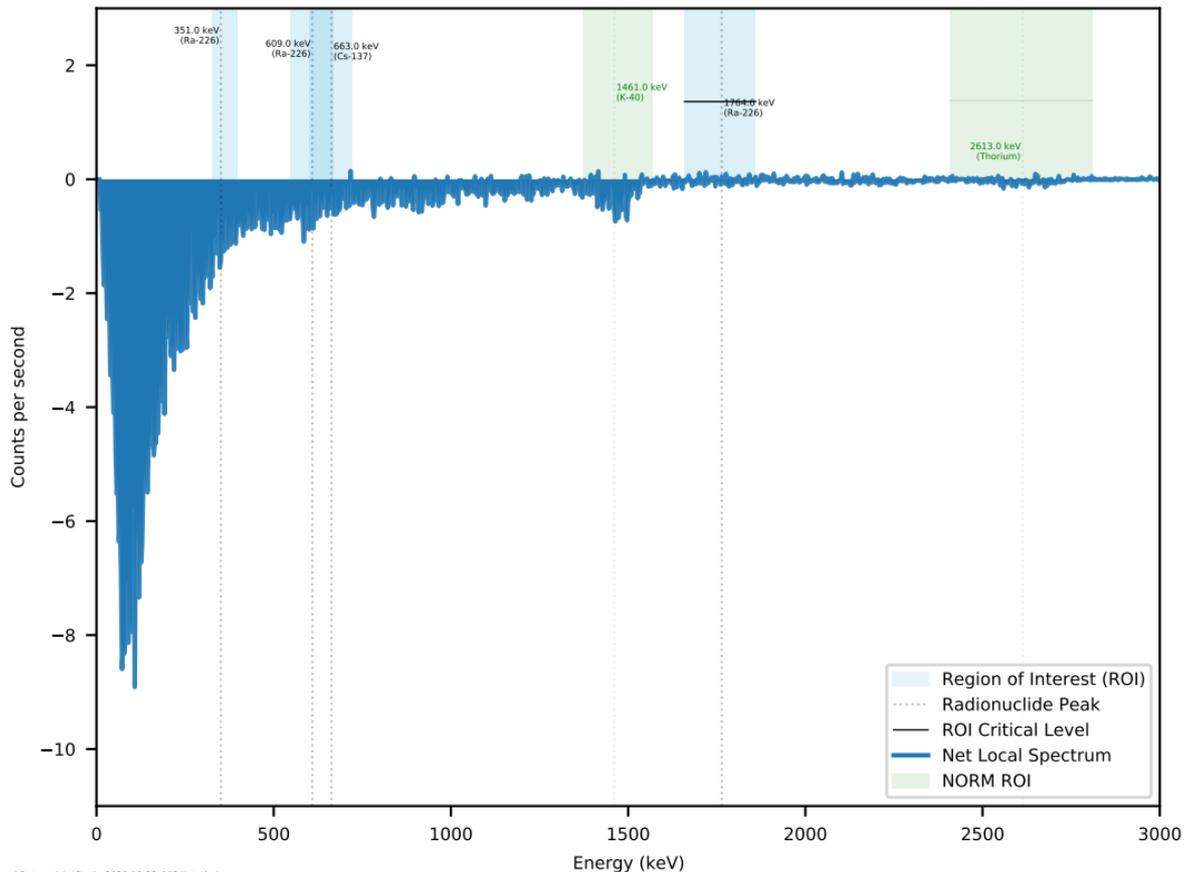


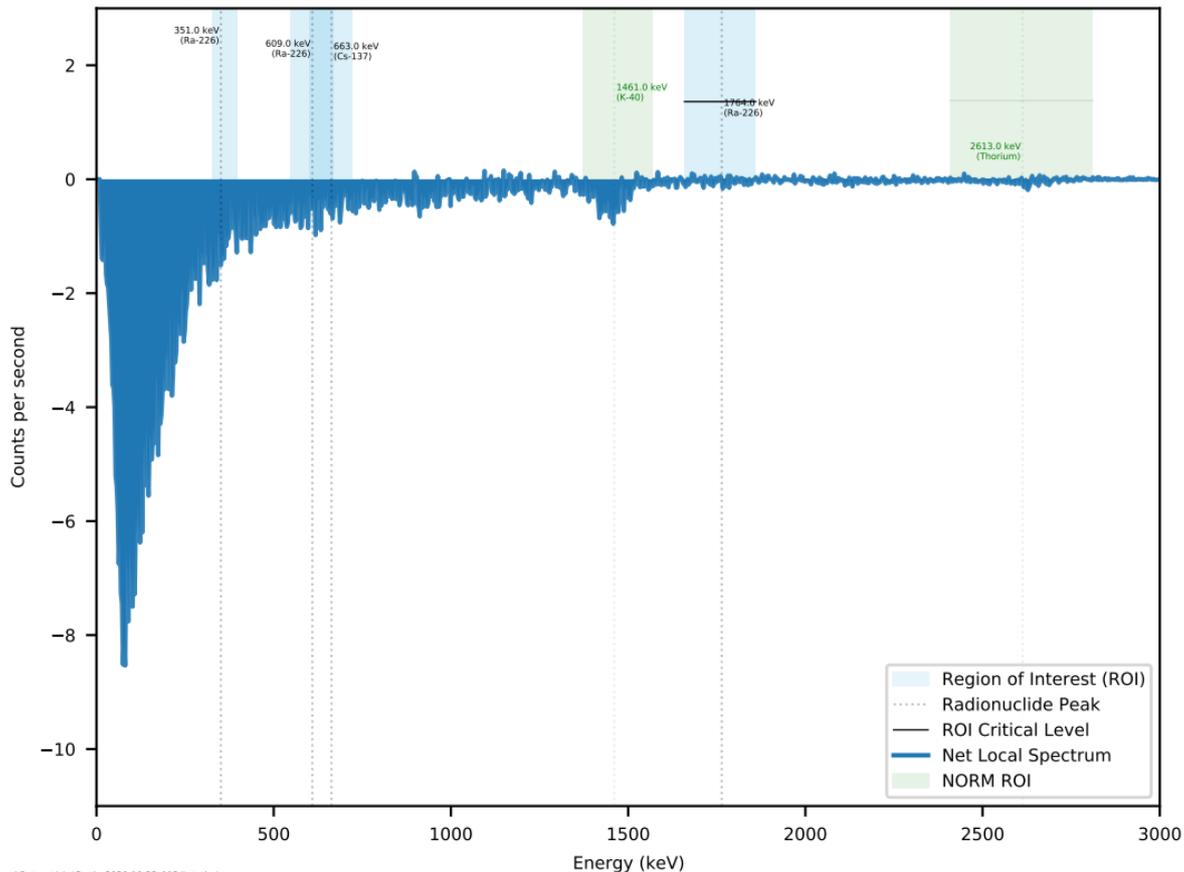


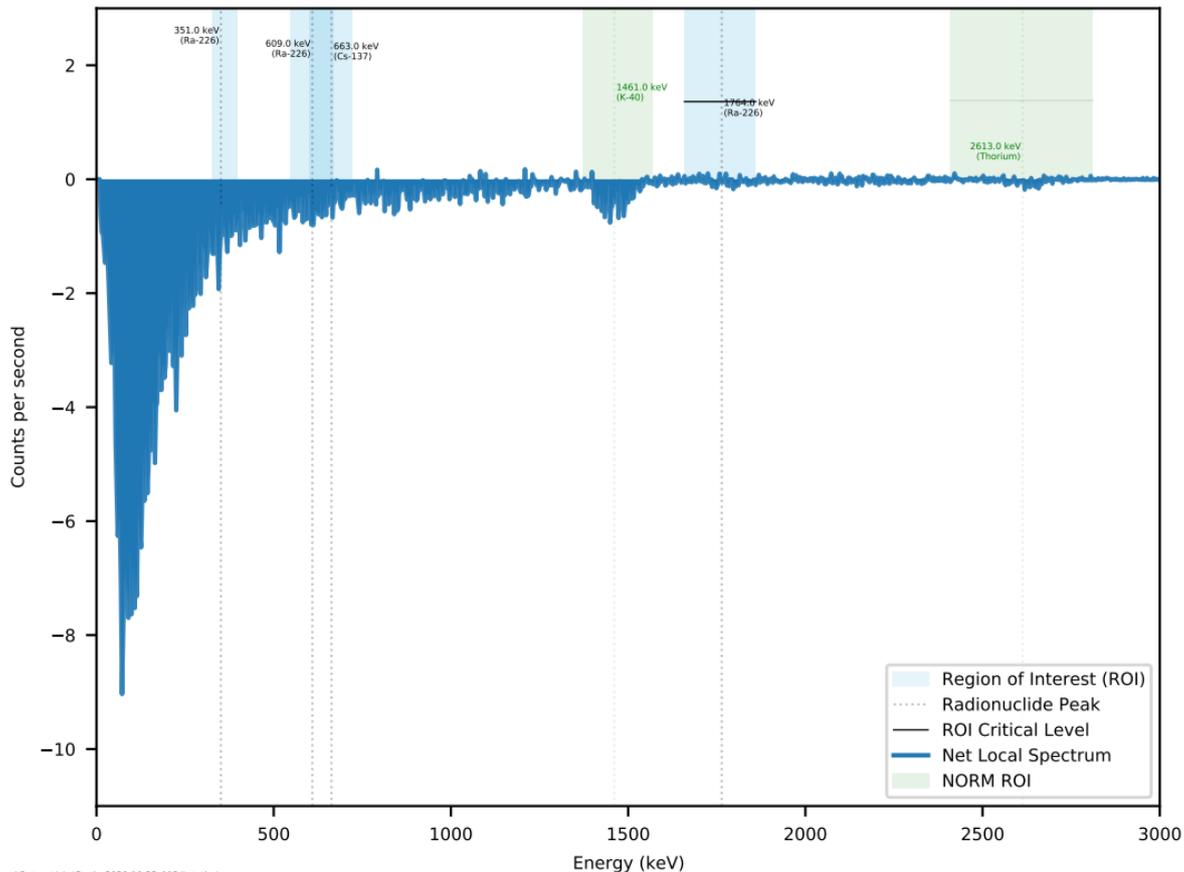














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40090-1
Laboratory Sample Delivery Group: GJ46599778
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/13/2021 11:53:41 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Job ID: 160-40090-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40090-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Job ID: 160-40090-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.9 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were leached on 10/27/2020, prepared on 11/06/2020 and analyzed on 01/13/2021 and 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21).

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488460/24-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/27/2020, prepared on 12/15/2020 and analyzed on 12/23/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491927/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-011 (160-40090-11) and HPPG-ESU-TU153C-021 (160-40090-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/27/2020, prepared on 11/03/2020 and analyzed on 12/03/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-487802/1-A)

Detectors 163-170 were calibrated on 11/6 therefore no monthly calibration verification (ccv) is needed until the the following monthly check which was 12/14 for these detectors. .HPPG-ESU-TU153C-001 (160-40090-1), (LCS 160-487802/2-A), (MB 160-487802/1-A) and (160-40090-A-1-F DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-002 (160-40090-2), HPPG-ESU-TU153C-003 (160-40090-3), HPPG-ESU-TU153C-004 (160-40090-4), HPPG-ESU-TU153C-005 (160-40090-5), HPPG-ESU-TU153C-006 (160-40090-6), HPPG-ESU-TU153C-007 (160-40090-7), HPPG-ESU-TU153C-008 (160-40090-8), HPPG-ESU-TU153C-009 (160-40090-9), HPPG-ESU-TU153C-010 (160-40090-10), HPPG-ESU-TU153C-011 (160-40090-11), HPPG-ESU-TU153C-012 (160-40090-12), HPPG-ESU-TU153C-013 (160-40090-13), HPPG-ESU-TU153C-014 (160-40090-14), HPPG-ESU-TU153C-015 (160-40090-15), HPPG-ESU-TU153C-016 (160-40090-16), HPPG-ESU-TU153C-017 (160-40090-17), HPPG-ESU-TU153C-018 (160-40090-18), HPPG-ESU-TU153C-019 (160-40090-19), HPPG-ESU-TU153C-020 (160-40090-20), HPPG-ESU-TU153C-021 (160-40090-21), HPPG-ESU-TU153C-022 (160-40090-22), HPPG-ESU-TU153C-023 (160-40090-23), HPPG-ESU-TU153C-024 (160-40090-24), HPPG-ESU-TU153C-025 (160-40090-25), HPPG-F-017 (160-40090-26) and HPPG-F-018 (160-40090-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/27/2020, prepared on 11/02/2020 and analyzed on 11/26/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Job ID: 160-40090-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 487736

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU153C-025 (160-40090-25) and HPPG-F-018 (160-40090-27)

The method blank (MB) z-score associated with Prep Batch 160-487736 is within limits and is stored in the level IV raw data. (MB 160-487736/1-A)

Gamma prep batch 487745

The method blank (MB) z-score associated with Prep Batch 160-487745 is within limits and is stored in the level IV raw data. (MB 160-487745/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU153C-001 (160-40090-1), HPPG-ESU-TU153C-008 (160-40090-8), HPPG-ESU-TU153C-012 (160-40090-12) and (160-40090-A-19-C DU)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU (160-40090-5; Pb-210, 160-40090-8; Cs-137, 160-40090-17; Th-234): HPPG-ESU-TU153C-005 (160-40090-5), HPPG-ESU-TU153C-008 (160-40090-8) and HPPG-ESU-TU153C-017 (160-40090-17). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Joaquin Ramirez

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4395
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U (234, 235/6, 238)	Isotopic Pu (238, 239/240)				
						Preservatives (water)								
						Preservatives (soil)								
HPPG-ESU-TU153C-001	10/23/2020	08:18	G	SO	1	16 oz. plastic jar	X		X		X	4	GJ46599778	
HPPG-ESU-TU153C-002	10/23/2020	08:21	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-003	10/23/2020	08:24	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-004	10/23/2020	08:28	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-005	10/23/2020	08:31	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-006	10/23/2020	08:33	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-007	10/23/2020	08:37	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-008	10/23/2020	08:40	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:27	SHIPPED TO LAB VIA FE		10/26/2020 08:38

*** Last 3 transfers shown above - Complete list of transfers on last page ***



160-40090 Chain of Custody





CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4395
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr			
	Preservatives (water)	Preservatives (soil)												
HPPG-ESU-TU153C-009	10/23/2020	08:44	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-010	10/23/2020	08:45	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-011	10/23/2020	08:48	G	SO	1	16 oz. plastic jar	X	X	X	X		4	GJ46599778	
HPPG-ESU-TU153C-012	10/23/2020	08:50	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-013	10/23/2020	08:53	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-014	10/23/2020	08:56	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-015	10/23/2020	08:58	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-016	10/23/2020	09:00	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-017	10/23/2020	09:03	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-018	10/23/2020	09:06	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-019	10/23/2020	09:10	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-020	10/23/2020	09:10	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-021	10/23/2020	09:11	G	SO	1	16 oz. plastic jar	X	X	X	X		4	GJ46599778	
HPPG-ESU-TU153C-022	10/23/2020	09:12	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-023	10/23/2020	09:13	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-024	10/23/2020	09:15	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	
HPPG-ESU-TU153C-025	10/23/2020	09:17	G	SO	1	16 oz. plastic jar	X					4	GJ46599778	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-016

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

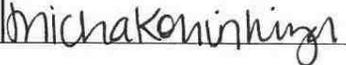
Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4395
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested							Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr				
							Preservatives (water)								
							Preservatives (soil)								
							Container Type								
HPPG-F-017	10/23/2020	08:37	G	SO	1	16 oz. plastic jar	X					4	GJ46599778		
HPPG-F-018	10/23/2020	09:10	G	SO	1	16 oz. plastic jar	X					4	GJ46599778		



All Transfers for COC 501197RSY-016

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:27	SHIPPED TO LAB Via FE		10/26/2020 08:30



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40090-1

SDG Number: GJ46599778

Login Number: 40090**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40090-1	HPPG-ESU-TU153C-001	Solid	10/23/20 08:18	10/26/20 08:38	
160-40090-2	HPPG-ESU-TU153C-002	Solid	10/23/20 08:21	10/26/20 08:38	
160-40090-3	HPPG-ESU-TU153C-003	Solid	10/23/20 08:24	10/26/20 08:38	
160-40090-4	HPPG-ESU-TU153C-004	Solid	10/23/20 08:28	10/26/20 08:38	
160-40090-5	HPPG-ESU-TU153C-005	Solid	10/23/20 08:31	10/26/20 08:38	
160-40090-6	HPPG-ESU-TU153C-006	Solid	10/23/20 08:33	10/26/20 08:38	
160-40090-7	HPPG-ESU-TU153C-007	Solid	10/23/20 08:37	10/26/20 08:38	
160-40090-8	HPPG-ESU-TU153C-008	Solid	10/23/20 08:40	10/26/20 08:38	
160-40090-9	HPPG-ESU-TU153C-009	Solid	10/23/20 08:44	10/26/20 08:38	
160-40090-10	HPPG-ESU-TU153C-010	Solid	10/23/20 08:45	10/26/20 08:38	
160-40090-11	HPPG-ESU-TU153C-011	Solid	10/23/20 08:48	10/26/20 08:38	
160-40090-12	HPPG-ESU-TU153C-012	Solid	10/23/20 08:50	10/26/20 08:38	
160-40090-13	HPPG-ESU-TU153C-013	Solid	10/23/20 08:53	10/26/20 08:38	
160-40090-14	HPPG-ESU-TU153C-014	Solid	10/23/20 08:56	10/26/20 08:38	
160-40090-15	HPPG-ESU-TU153C-015	Solid	10/23/20 08:58	10/26/20 08:38	
160-40090-16	HPPG-ESU-TU153C-016	Solid	10/23/20 09:00	10/26/20 08:38	
160-40090-17	HPPG-ESU-TU153C-017	Solid	10/23/20 09:03	10/26/20 08:38	
160-40090-18	HPPG-ESU-TU153C-018	Solid	10/23/20 09:06	10/26/20 08:38	
160-40090-19	HPPG-ESU-TU153C-019	Solid	10/23/20 09:10	10/26/20 08:38	
160-40090-20	HPPG-ESU-TU153C-020	Solid	10/23/20 09:10	10/26/20 08:38	
160-40090-21	HPPG-ESU-TU153C-021	Solid	10/23/20 09:11	10/26/20 08:38	
160-40090-22	HPPG-ESU-TU153C-022	Solid	10/23/20 09:12	10/26/20 08:38	
160-40090-23	HPPG-ESU-TU153C-023	Solid	10/23/20 09:13	10/26/20 08:38	
160-40090-24	HPPG-ESU-TU153C-024	Solid	10/23/20 09:15	10/26/20 08:38	
160-40090-25	HPPG-ESU-TU153C-025	Solid	10/23/20 09:17	10/26/20 08:38	
160-40090-26	HPPG-F-017	Solid	10/23/20 08:37	10/26/20 08:38	
160-40090-27	HPPG-F-018	Solid	10/23/20 09:10	10/26/20 08:38	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-001

Lab Sample ID: 160-40090-1

Date Collected: 10/23/20 08:18

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0255	U	0.0600	0.0600	0.160	0.0514	pCi/g	11/06/20 11:01	11/26/20 10:43	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	88.5		40 - 110					11/06/20 11:01	11/26/20 10:43	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.0141	U	0.0121	0.0121	0.100	0.0133	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.0141	U	0.0121	0.0122	0.100	0.0133	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	87.6		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.415		0.0603	0.0696	0.250	0.00707	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0294		0.0177	0.0179	0.100	0.00622	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.352		0.0556	0.0629	0.250	0.00705	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	80.8		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0449	U	0.207	0.207		0.361	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Actinium 228	0.364		0.133	0.138		0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Bismuth-212	-0.122	U	1.06	1.06		0.858	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Bismuth-214	0.396		0.129	0.136		0.0506	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Cesium-137	-0.0751	U	0.0815	0.0819	0.0700	0.0791	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Lead-210	-0.121	U	1.47	1.47		1.04	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Lead-212	0.361		0.0822	0.0945		0.0273	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Lead-214	0.391		0.126	0.132		0.0655	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Potassium-40	8.42		1.59	1.81		0.280	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Protactinium-231	0.620	U	1.89	1.89		2.08	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Protactinium-234	-0.103	U	0.100	0.101		0.214	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Radium-226	0.396		0.129	0.136	0.200	0.0506	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Radium-228	0.364		0.133	0.138		0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Thallium-208	0.119		0.0578	0.0591		0.0234	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Thorium-232	0.364		0.133	0.138		0.270	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Thorium-234	0.267	U	0.511	0.511		0.401	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Thorium 228	0.361		0.0822	0.0945		0.0273	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Uranium-235	-0.187	U	0.153	0.154		0.358	pCi/g	11/02/20 16:42	11/26/20 15:15	1
Uranium-238	0.267	U	0.511	0.511		0.401	pCi/g	11/02/20 16:42	11/26/20 15:15	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-002

Lab Sample ID: 160-40090-2

Date Collected: 10/23/20 08:21

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.116	U	0.338	0.338		0.319	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Actinium 228	0.341		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Bismuth-212	0.456	U	0.907	0.908		0.719	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Bismuth-214	0.476		0.105	0.116		0.0351	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Cesium-137	0.0138	U	0.0630	0.0631	0.0700	0.0509	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Lead-210	-0.714	U	1.58	1.58		1.27	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Lead-212	0.436		0.0853	0.102		0.0424	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Lead-214	0.463		0.0878	0.100		0.0383	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Potassium-40	7.46		1.15	1.38		0.268	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Protactinium-231	0.527	U	1.59	1.59		1.74	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Protactinium-234	0.0644	U	0.0994	0.0997		0.245	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Radium-226	0.476		0.105	0.116	0.200	0.0351	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Radium-228	0.341		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Thallium-208	0.176		0.0485	0.0518		0.0138	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Thorium-232	0.341		0.242	0.244		0.116	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Thorium-234	-0.372	U	0.422	0.424		0.973	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Thorium 228	0.436		0.0853	0.102		0.0424	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Uranium-235	0.202	U	0.378	0.379		0.382	pCi/g	11/02/20 16:42	11/26/20 15:16	1
Uranium-238	-0.372	U	0.422	0.424		0.973	pCi/g	11/02/20 16:42	11/26/20 15:16	1

Client Sample ID: HPPG-ESU-TU153C-003

Lab Sample ID: 160-40090-3

Date Collected: 10/23/20 08:24

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.380	U	0.721	0.722		0.436	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Actinium 228	0.193		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Bismuth-212	-0.0807	U	0.823	0.823		0.671	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Bismuth-214	0.387		0.152	0.157		0.0669	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Cesium-137	-0.0300	U	0.0657	0.0658	0.0700	0.0516	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Lead-210	-0.886	U	1.62	1.62		1.37	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Lead-212	0.450		0.0915	0.103		0.0440	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Lead-214	0.372		0.102	0.108		0.0601	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Potassium-40	8.82		1.30	1.58		0.112	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Protactinium-231	0.446	U	1.76	1.76		2.22	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Protactinium-234	-0.0118	U	0.0277	0.0277		0.257	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Radium-226	0.387		0.152	0.157	0.200	0.0669	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Radium-228	0.193		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Thallium-208	0.131		0.0511	0.0528		0.0180	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Thorium-232	0.193		0.247	0.248		0.144	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Thorium-234	-0.414	U	1.00	1.01		0.838	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Thorium 228	0.450		0.0915	0.103		0.0440	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Uranium-235	-0.189	U	0.565	0.565		0.460	pCi/g	11/02/20 16:42	11/26/20 15:17	1
Uranium-238	-0.414	U	1.00	1.01		0.838	pCi/g	11/02/20 16:42	11/26/20 15:17	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-004

Lab Sample ID: 160-40090-4

Date Collected: 10/23/20 08:28

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.188	U	0.406	0.406		0.233	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Actinium 228	0.488		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Bismuth-212	0.360	U	0.676	0.677		0.531	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Bismuth-214	0.345		0.0856	0.0928		0.0322	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Cesium-137	0.0181	U	0.0340	0.0341	0.0700	0.0259	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Lead-210	0.466	U	0.857	0.858		0.675	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Lead-212	0.0444	U	0.102	0.102		0.0823	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Lead-214	0.446		0.105	0.115		0.0392	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Potassium-40	8.87		1.11	1.43		0.0810	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Protactinium-231	-0.666	U	2.03	2.03		1.65	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Protactinium-234	-0.0820	U	0.230	0.230		0.187	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Radium-226	0.345		0.0856	0.0928	0.200	0.0322	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Radium-228	0.488		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thallium-208	0.139		0.0378	0.0404		0.00820	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thorium-232	0.488		0.116	0.126		0.0205	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thorium-234	0.0314	U	0.0605	0.0606		0.784	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Thorium 228	0.0444	U	0.102	0.102		0.0823	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Uranium-235	0.0855	U	0.171	0.171		0.332	pCi/g	11/02/20 16:42	11/26/20 15:18	1
Uranium-238	0.0314	U	0.0605	0.0606		0.784	pCi/g	11/02/20 16:42	11/26/20 15:18	1

Client Sample ID: HPPG-ESU-TU153C-005

Lab Sample ID: 160-40090-5

Date Collected: 10/23/20 08:31

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.311	U	0.503	0.504		0.329	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Actinium 228	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Bismuth-212	0.269	U	0.732	0.733		0.574	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Bismuth-214	0.448		0.182	0.188		0.0725	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Cesium-137	-0.00130	U	0.0617	0.0617	0.0700	0.0507	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Lead-210	-1.71	U	1.12	1.14		1.59	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Lead-212	0.402		0.113	0.125		0.0488	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Lead-214	0.324		0.144	0.147		0.102	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Potassium-40	7.78		1.39	1.60		0.144	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Protactinium-231	0.630	U	2.42	2.43		1.97	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Protactinium-234	0.0601	U	0.0491	0.0495		0.244	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Radium-226	0.448		0.182	0.188	0.200	0.0725	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Radium-228	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thallium-208	0.165		0.0629	0.0652		0.0241	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thorium-232	0.122	U	0.283	0.283		0.177	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thorium-234	-0.491	U	0.585	0.587		1.04	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Thorium 228	0.402		0.113	0.125		0.0488	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Uranium-235	-0.0205	U	0.313	0.313		0.422	pCi/g	11/02/20 16:42	11/26/20 15:19	1
Uranium-238	-0.491	U	0.585	0.587		1.04	pCi/g	11/02/20 16:42	11/26/20 15:19	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-006

Lab Sample ID: 160-40090-6

Date Collected: 10/23/20 08:33

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.306		0.462	0.463		0.290	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Actinium 228	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Bismuth-212	0.0422	U	1.09	1.09		0.898	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Bismuth-214	0.515		0.144	0.154		0.0453	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Cesium-137	-0.0138	U	0.0651	0.0651	0.0700	0.0661	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-210	-0.973	U	1.90	1.91		1.60	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-212	0.444		0.0886	0.100		0.0365	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Lead-214	0.412		0.109	0.117		0.0431	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Potassium-40	9.84		1.65	1.93		0.235	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Protactinium-231	0.000	U	0.346	0.346		2.23	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Protactinium-234	0.0841	U	0.261	0.261		0.212	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Radium-226	0.515		0.144	0.154	0.200	0.0453	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Radium-228	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thallium-208	0.115		0.0924	0.0931		0.0423	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium-232	0.460		0.142	0.150		0.0379	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium-234	0.274	U	0.562	0.563		0.455	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Thorium 228	0.444		0.0886	0.100		0.0365	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Uranium-235	0.00369	U	0.0169	0.0169		0.423	pCi/g	11/02/20 16:42	11/26/20 15:57	1
Uranium-238	0.274	U	0.562	0.563		0.455	pCi/g	11/02/20 16:42	11/26/20 15:57	1

Client Sample ID: HPPG-ESU-TU153C-007

Lab Sample ID: 160-40090-7

Date Collected: 10/23/20 08:37

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0720	U	0.294	0.294		0.291	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Actinium 228	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-212	-0.0492	U	0.825	0.825		0.676	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-214	0.0727	U	0.157	0.158		0.146	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Cesium-137	0.00327	U	0.0520	0.0520	0.0700	0.0425	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-210	-1.15	U	1.50	1.51		1.28	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-212	0.340		0.0849	0.0956		0.0465	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-214	0.290		0.107	0.111		0.0958	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Potassium-40	7.75		1.22	1.46		0.271	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-231	0.000	U	0.325	0.325		2.10	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-234	0.0416	U	0.103	0.103		0.160	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-226	0.0727	U	0.157	0.158	0.200	0.146	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-228	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thallium-208	0.0978		0.0805	0.0811		0.0440	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-232	0.471		0.194	0.200		0.0627	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-234	-0.447	U	0.482	0.484		0.712	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium 228	0.340		0.0849	0.0956		0.0465	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-235	-0.0795	U	0.225	0.225		0.229	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-238	-0.447	U	0.482	0.484		0.712	pCi/g	11/02/20 16:42	11/26/20 16:00	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-008

Lab Sample ID: 160-40090-8

Date Collected: 10/23/20 08:40

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.181	U	0.332	0.333		0.347	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Actinium 228	0.556		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Bismuth-212	-0.353	U	0.905	0.906		0.708	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Bismuth-214	0.434		0.146	0.153		0.0608	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Cesium-137	-0.0838	U	0.0492	0.0499	0.0700	0.0931	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Lead-210	0.816		1.17	1.17		0.753	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Lead-212	0.368		0.100	0.111		0.0535	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Lead-214	0.344		0.114	0.120		0.0759	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Potassium-40	8.82		1.64	1.87		0.284	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Protactinium-231	0.000	U	0.204	0.204		2.14	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Protactinium-234	0.0714	U	0.199	0.200		0.168	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Radium-226	0.434		0.146	0.153	0.200	0.0608	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Radium-228	0.556		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Thallium-208	0.121		0.0745	0.0755		0.0353	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Thorium-232	0.556		0.208	0.216		0.0420	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Thorium-234	-0.153	U	0.859	0.859		0.712	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Thorium 228	0.368		0.100	0.111		0.0535	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Uranium-235	0.141	U	0.304	0.305		0.291	pCi/g	11/02/20 16:42	11/26/20 15:59	1
Uranium-238	-0.153	U	0.859	0.859		0.712	pCi/g	11/02/20 16:42	11/26/20 15:59	1

Client Sample ID: HPPG-ESU-TU153C-009

Lab Sample ID: 160-40090-9

Date Collected: 10/23/20 08:44

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.117	U	0.243	0.244		0.319	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Actinium 228	0.500		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-212	-0.527	U	0.802	0.804		0.626	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-214	0.354		0.0954	0.102		0.0378	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Cesium-137	0.00130	U	0.0402	0.0402	0.0700	0.0330	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-210	-0.110	U	1.38	1.38		1.13	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-212	0.426		0.0780	0.0955		0.0350	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-214	0.396		0.0913	0.100		0.0411	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Potassium-40	8.61		1.20	1.49		0.253	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-231	0.454	U	1.40	1.40		1.53	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-234	0.102	U	0.195	0.195		0.167	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Radium-226	0.354		0.0954	0.102	0.200	0.0378	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Radium-228	0.500		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thallium-208	0.141		0.0595	0.0613		0.0251	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-232	0.500		0.155	0.163		0.0645	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-234	-0.343	U	0.281	0.284		0.923	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium 228	0.426		0.0780	0.0955		0.0350	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-235	-0.0580	U	0.160	0.160		0.308	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-238	-0.343	U	0.281	0.284		0.923	pCi/g	11/02/20 16:42	11/26/20 16:04	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-010

Lab Sample ID: 160-40090-10

Date Collected: 10/23/20 08:45

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.252	U	0.488	0.489		0.289	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Actinium 228	0.652		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Bismuth-212	-0.0155	U	0.622	0.622		0.511	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Bismuth-214	0.357		0.143	0.147		0.0686	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Cesium-137	0.0281	U	0.0549	0.0550	0.0700	0.0419	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Lead-210	-1.00	U	1.84	1.84		1.55	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Lead-212	0.375		0.0911	0.0991		0.0452	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Lead-214	0.404		0.120	0.126		0.0550	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Potassium-40	9.09		1.42	1.69		0.128	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Protactinium-231	0.724	U	2.06	2.06		2.26	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Protactinium-234	-0.116	U	0.354	0.354		0.288	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Radium-226	0.357		0.143	0.147	0.200	0.0686	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Radium-228	0.652		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Thallium-208	0.211		0.0623	0.0659		0.0164	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Thorium-232	0.652		0.183	0.195		0.0740	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Thorium-234	-0.990	U	0.695	0.704		0.970	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Thorium 228	0.375		0.0911	0.0991		0.0452	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Uranium-235	0.0636	U	0.601	0.601		0.493	pCi/g	11/02/20 16:42	11/26/20 16:02	1
Uranium-238	-0.990	U	0.695	0.704		0.970	pCi/g	11/02/20 16:42	11/26/20 16:02	1

Client Sample ID: HPPG-ESU-TU153C-011

Lab Sample ID: 160-40090-11

Date Collected: 10/23/20 08:48

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0361	U	0.0562	0.0562	0.160	0.0429	pCi/g	11/06/20 11:01	01/13/21 06:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	91.9		40 - 110					11/06/20 11:01	01/13/21 06:54	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	0.00557	U	0.00983	0.00984	0.100	0.00611	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.00186	U	0.00831	0.00831	0.100	0.00749	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	91.1		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.367		0.0569	0.0647	0.250	0.00860	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0186		0.0140	0.0141	0.100	0.00618	pCi/g	11/03/20 12:03	12/03/20 16:16	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-011

Lab Sample ID: 160-40090-11

Date Collected: 10/23/20 08:48

Matrix: Solid

Date Received: 10/26/20 08:38

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-238	0.479		0.0647	0.0762	0.250	0.00858	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	84.6		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.100	U	0.217	0.217		0.277	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Actinium 228	0.445		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-212	-0.139	U	0.581	0.581		0.466	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Bismuth-214	0.407		0.118	0.126		0.0512	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Cesium-137	-0.0282	U	0.0510	0.0511	0.0700	0.0396	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-210	0.528	U	1.15	1.15		0.921	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-212	0.391		0.0729	0.0887		0.0319	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Lead-214	0.421		0.0895	0.0996		0.0491	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Potassium-40	7.07		1.04	1.27		0.0890	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-231	0.000	U	0.714	0.714		1.74	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Protactinium-234	-0.0203	U	0.115	0.115		0.195	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-226	0.407		0.118	0.126	0.200	0.0512	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Radium-228	0.445		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thallium-208	0.159		0.0464	0.0493		0.0142	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-232	0.445		0.131	0.139		0.0226	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium-234	0.0118	U	0.0215	0.0215		0.708	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Thorium 228	0.391		0.0729	0.0887		0.0319	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-235	0.0933	U	0.403	0.403		0.329	pCi/g	11/02/20 16:42	11/26/20 16:00	1
Uranium-238	0.0118	U	0.0215	0.0215		0.708	pCi/g	11/02/20 16:42	11/26/20 16:00	1

Client Sample ID: HPPG-ESU-TU153C-012

Lab Sample ID: 160-40090-12

Date Collected: 10/23/20 08:50

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0328	U	0.110	0.110		0.364	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Actinium 228	0.404		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Bismuth-212	-0.385	U	1.17	1.17		0.934	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Bismuth-214	0.0664	U	0.168	0.168		0.160	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Cesium-137	-0.0597	U	0.0952	0.0954	0.0700	0.0740	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Lead-210	0.676	U	1.43	1.43		0.915	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Lead-212	0.324		0.0973	0.106		0.0564	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Lead-214	0.483		0.0928	0.106		0.0130	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Potassium-40	7.09		1.36	1.54		0.152	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Protactinium-231	0.389	U	1.43	1.43		2.27	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Protactinium-234	0.109	U	0.293	0.293		0.238	pCi/g	11/02/20 16:42	11/26/20 16:05	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-012

Lab Sample ID: 160-40090-12

Date Collected: 10/23/20 08:50

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.0664	U	0.168	0.168	0.200	0.160	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Radium-228	0.404		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thallium-208	0.108		0.0751	0.0759		0.0371	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thorium-232	0.404		0.206	0.210		0.120	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thorium-234	-0.517	U	0.797	0.799		1.15	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Thorium 228	0.324		0.0973	0.106		0.0564	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Uranium-235	0.254		0.260	0.261		0.226	pCi/g	11/02/20 16:42	11/26/20 16:05	1
Uranium-238	-0.517	U	0.797	0.799		1.15	pCi/g	11/02/20 16:42	11/26/20 16:05	1

Client Sample ID: HPPG-ESU-TU153C-013

Lab Sample ID: 160-40090-13

Date Collected: 10/23/20 08:53

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.281	U	0.489	0.490		0.329	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Actinium 228	0.471		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-212	0.295	U	0.729	0.729		0.571	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Bismuth-214	0.585		0.153	0.164		0.0538	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Cesium-137	0.0301	U	0.0568	0.0569	0.0700	0.0436	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-210	1.07		1.40	1.41		0.924	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-212	0.521		0.101	0.121		0.0451	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Lead-214	0.420		0.111	0.119		0.0617	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Potassium-40	9.01		1.53	1.78		0.420	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-231	-0.765	U	2.95	2.95		2.40	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Protactinium-234	0.103	U	0.286	0.287		0.211	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Radium-226	0.585		0.153	0.164	0.200	0.0538	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Radium-228	0.471		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thallium-208	0.143		0.0508	0.0529		0.0192	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-232	0.471		0.180	0.186		0.0671	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium-234	-0.372	U	0.951	0.952		0.794	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Thorium 228	0.521		0.101	0.121		0.0451	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-235	0.000	U	0.237	0.237		0.457	pCi/g	11/02/20 16:42	11/26/20 16:04	1
Uranium-238	-0.372	U	0.951	0.952		0.794	pCi/g	11/02/20 16:42	11/26/20 16:04	1

Client Sample ID: HPPG-ESU-TU153C-014

Lab Sample ID: 160-40090-14

Date Collected: 10/23/20 08:56

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.369		0.384	0.386		0.214	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Actinium 228	0.505		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Bismuth-212	0.447	U	0.783	0.784		0.599	pCi/g	11/02/20 16:42	11/26/20 16:32	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-014

Lab Sample ID: 160-40090-14

Date Collected: 10/23/20 08:56

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.486		0.125	0.134		0.0427	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Cesium-137	0.0133	U	0.0653	0.0653	0.0700	0.0524	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-210	1.99		1.46	1.48		0.846	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-212	0.434		0.0881	0.0990		0.0417	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Lead-214	0.360		0.0965	0.103		0.0507	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Potassium-40	8.29		1.44	1.67		0.213	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Protactinium-231	0.490	U	2.03	2.03		2.01	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Protactinium-234	-0.0136	U	0.0263	0.0263		0.233	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Radium-226	0.486		0.125	0.134	0.200	0.0427	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Radium-228	0.505		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thallium-208	0.219		0.0617	0.0656		0.0169	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium-232	0.505		0.219	0.225		0.0741	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium-234	0.409		0.503	0.505		0.390	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Thorium 228	0.434		0.0881	0.0990		0.0417	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Uranium-235	0.108	U	0.272	0.272		0.205	pCi/g	11/02/20 16:42	11/26/20 16:32	1
Uranium-238	0.409		0.503	0.505		0.390	pCi/g	11/02/20 16:42	11/26/20 16:32	1

Client Sample ID: HPPG-ESU-TU153C-015

Lab Sample ID: 160-40090-15

Date Collected: 10/23/20 08:58

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.199	U	0.597	0.597		0.364	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Actinium 228	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-212	-0.0244	U	0.686	0.686		0.563	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-214	0.184		0.0984	0.100		0.113	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Cesium-137	-0.0383	U	0.0664	0.0665	0.0700	0.0517	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-210	1.07		1.31	1.32		0.852	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-212	0.383		0.0863	0.0995		0.0449	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-214	0.401		0.104	0.112		0.0894	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Potassium-40	8.35		1.26	1.52		0.269	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-231	0.582	U	1.86	1.86		2.03	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-234	0.114	U	0.0951	0.0958		0.164	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-226	0.184		0.0984	0.100	0.200	0.113	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-228	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thallium-208	0.138		0.0476	0.0497		0.0197	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-232	0.477		0.147	0.155		0.0622	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-234	0.420		0.456	0.459		0.349	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium 228	0.383		0.0863	0.0995		0.0449	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-235	0.0595	U	0.312	0.313		0.244	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-238	0.420		0.456	0.459		0.349	pCi/g	11/02/20 16:42	11/26/20 16:34	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-016

Lab Sample ID: 160-40090-16

Date Collected: 10/23/20 09:00

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.288	U	0.629	0.630		0.377	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Actinium 228	0.202		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-212	-0.403	U	0.911	0.912		0.708	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Bismuth-214	0.325		0.141	0.145		0.0669	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Cesium-137	0.00969	U	0.0669	0.0669	0.0700	0.0536	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-210	1.11		1.01	1.02		0.636	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-212	0.373		0.0936	0.105		0.0446	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Lead-214	0.365		0.123	0.129		0.0561	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Potassium-40	7.24		1.48	1.66		0.279	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-231	-0.962	U	3.03	3.03		2.46	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Protactinium-234	0.0490	U	0.0911	0.0913		0.161	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-226	0.325		0.141	0.145	0.200	0.0669	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Radium-228	0.202		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thallium-208	0.0969		0.0786	0.0793		0.0347	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-232	0.202		0.200	0.201		0.157	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium-234	-0.728	U	0.938	0.942		0.840	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Thorium 228	0.373		0.0936	0.105		0.0446	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-235	-0.156	U	0.503	0.503		0.276	pCi/g	11/02/20 16:42	11/26/20 16:34	1
Uranium-238	-0.728	U	0.938	0.942		0.840	pCi/g	11/02/20 16:42	11/26/20 16:34	1

Client Sample ID: HPPG-ESU-TU153C-017

Lab Sample ID: 160-40090-17

Date Collected: 10/23/20 09:03

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.290	U	0.565	0.566		0.325	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Actinium 228	0.211		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Bismuth-212	0.340	U	0.590	0.592		0.452	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Bismuth-214	0.309		0.107	0.111		0.0497	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Cesium-137	0.0155	U	0.0529	0.0529	0.0700	0.0421	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Lead-210	0.696	U	1.54	1.54		1.24	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Lead-212	0.385		0.0839	0.0976		0.0430	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Lead-214	0.413		0.0911	0.101		0.0423	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Potassium-40	8.06		1.23	1.48		0.282	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Protactinium-231	0.000	U	0.438	0.438		1.99	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Protactinium-234	0.0494	U	0.0806	0.0808		0.209	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Radium-226	0.309		0.107	0.111	0.200	0.0497	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Radium-228	0.211		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Thallium-208	0.161		0.0500	0.0527		0.0172	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Thorium-232	0.211		0.115	0.117		0.122	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Thorium-234	-0.391	U	0.174	0.179		1.05	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Thorium 228	0.385		0.0839	0.0976		0.0430	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Uranium-235	-0.0376	U	0.110	0.110		0.406	pCi/g	11/02/20 16:42	11/26/20 16:36	1
Uranium-238	-0.391	U	0.174	0.179		1.05	pCi/g	11/02/20 16:42	11/26/20 16:36	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-018

Lab Sample ID: 160-40090-18

Date Collected: 10/23/20 09:06

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.168	U	0.640	0.640		0.391	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Actinium 228	0.490		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Bismuth-212	-0.0501	U	0.791	0.791		0.647	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Bismuth-214	0.496		0.132	0.142		0.0526	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Cesium-137	-0.00367	U	0.0760	0.0760	0.0700	0.0623	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Lead-210	1.72		1.44	1.46		0.933	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Lead-212	0.461		0.0985	0.110		0.0486	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Lead-214	0.402		0.129	0.135		0.0571	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Potassium-40	9.65		1.43	1.73		0.123	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Protactinium-231	0.000	U	0.703	0.703		2.70	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Protactinium-234	-0.105	U	0.318	0.318		0.258	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Radium-226	0.496		0.132	0.142	0.200	0.0526	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Radium-228	0.490		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Thallium-208	0.168		0.0849	0.0866		0.0366	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Thorium-232	0.490		0.211	0.217		0.0709	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Thorium-234	0.697		0.612	0.617		0.488	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Thorium 228	0.461		0.0985	0.110		0.0486	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Uranium-235	0.0441	U	0.261	0.261		0.457	pCi/g	11/02/20 16:42	11/26/20 16:37	1
Uranium-238	0.697		0.612	0.617		0.488	pCi/g	11/02/20 16:42	11/26/20 16:37	1

Client Sample ID: HPPG-ESU-TU153C-019

Lab Sample ID: 160-40090-19

Date Collected: 10/23/20 09:10

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.353	U	0.685	0.687		0.396	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Actinium 228	0.563		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Bismuth-212	-0.274	U	0.688	0.689		0.542	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Bismuth-214	0.351		0.119	0.125		0.0535	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Cesium-137	-0.0282	U	0.0606	0.0606	0.0700	0.0475	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Lead-210	-0.339	U	1.47	1.47		1.20	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Lead-212	0.387		0.0746	0.0898		0.0279	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Lead-214	0.416		0.101	0.110		0.0370	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Potassium-40	8.18		1.32	1.56		0.255	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Protactinium-231	-0.765	U	2.49	2.49		2.02	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Protactinium-234	-0.102	U	0.286	0.286		0.233	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Radium-226	0.351		0.119	0.125	0.200	0.0535	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Radium-228	0.563		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Thallium-208	0.156		0.0504	0.0529		0.0139	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Thorium-232	0.563		0.138	0.149		0.0834	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Thorium-234	0.312	U	0.839	0.840		0.838	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Thorium 228	0.387		0.0746	0.0898		0.0279	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Uranium-235	0.0910	U	0.196	0.197		0.440	pCi/g	11/02/20 16:42	11/26/20 16:38	1
Uranium-238	0.312	U	0.839	0.840		0.838	pCi/g	11/02/20 16:42	11/26/20 16:38	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-020

Lab Sample ID: 160-40090-20

Date Collected: 10/23/20 09:10

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0380	U	0.0640	0.0642		0.287	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Actinium 228	0.399		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Bismuth-212	0.362	U	0.646	0.647		0.505	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Bismuth-214	0.404		0.0914	0.101		0.0324	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Cesium-137	-0.0150	U	0.0451	0.0451	0.0700	0.0358	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Lead-210	-0.398	U	1.26	1.26		1.02	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Lead-212	0.425		0.0687	0.0880		0.0249	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Lead-214	0.363		0.0769	0.0857		0.0391	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Potassium-40	7.97		1.06	1.33		0.0815	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Protactinium-231	0.000	U	0.224	0.224		1.58	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Protactinium-234	-0.0811	U	0.228	0.228		0.185	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Radium-226	0.404		0.0914	0.101	0.200	0.0324	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Radium-228	0.399		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Thallium-208	0.128		0.0368	0.0391		0.00824	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Thorium-232	0.399		0.150	0.156		0.0653	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Thorium-234	0.334	U	0.810	0.811		0.659	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Thorium 228	0.425		0.0687	0.0880		0.0249	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Uranium-235	0.220	U	0.236	0.237		0.254	pCi/g	11/02/20 15:15	11/26/20 12:44	1
Uranium-238	0.334	U	0.810	0.811		0.659	pCi/g	11/02/20 15:15	11/26/20 12:44	1

Client Sample ID: HPPG-ESU-TU153C-021

Lab Sample ID: 160-40090-21

Date Collected: 10/23/20 09:11

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0247	U	0.0775	0.0775	0.160	0.0619	pCi/g	11/06/20 11:01	01/13/21 06:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	75.2		40 - 110					11/06/20 11:01	01/13/21 06:54	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.00630	U	0.0139	0.0139	0.100	0.0129	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	0.00210	U	0.0126	0.0126	0.100	0.00978	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	82.9		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.365		0.0567	0.0644	0.250	0.00707	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0321		0.0185	0.0187	0.100	0.00622	pCi/g	11/03/20 12:03	12/03/20 16:16	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-021

Lab Sample ID: 160-40090-21

Date Collected: 10/23/20 09:11

Matrix: Solid

Date Received: 10/26/20 08:38

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-238	0.339		0.0542	0.0612	0.250	0.00499	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	79.8		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.351	U	0.582	0.584		0.466	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Actinium 228	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Bismuth-212	-0.0213	U	0.677	0.677		0.556	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Bismuth-214	-0.0170	U	0.0682	0.0682		0.184	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Cesium-137	-0.0275	U	0.0649	0.0650	0.0700	0.0510	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-210	1.31		1.24	1.25		0.842	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-212	0.310		0.0891	0.0977		0.0503	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Lead-214	0.384		0.121	0.127		0.0554	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Potassium-40	7.34		1.29	1.49		0.308	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Protactinium-231	0.398	U	1.62	1.62		2.34	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Protactinium-234	-0.0994	U	0.317	0.317		0.258	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Radium-226	-0.0170	U	0.0682	0.0682	0.200	0.184	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Radium-228	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thallium-208	0.138		0.0753	0.0767		0.0348	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium-232	0.231		0.129	0.132		0.132	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium-234	0.547		0.562	0.565		0.428	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Thorium 228	0.310		0.0891	0.0977		0.0503	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Uranium-235	0.201	U	0.396	0.397		0.398	pCi/g	11/02/20 15:34	11/26/20 14:43	1
Uranium-238	0.547		0.562	0.565		0.428	pCi/g	11/02/20 15:34	11/26/20 14:43	1

Client Sample ID: HPPG-ESU-TU153C-022

Lab Sample ID: 160-40090-22

Date Collected: 10/23/20 09:12

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.362	U	0.601	0.603		0.379	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Actinium 228	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Bismuth-212	0.0421	U	0.565	0.565		0.460	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Bismuth-214	0.410		0.123	0.130		0.0462	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Cesium-137	0.0259	U	0.0614	0.0614	0.0700	0.0481	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-210	-0.174	U	1.32	1.32		1.09	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-212	0.244		0.0919	0.0972		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Lead-214	0.393		0.109	0.116		0.0399	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Potassium-40	7.26		1.26	1.46		0.127	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Protactinium-231	-0.898	U	2.59	2.59		2.10	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Protactinium-234	0.0779	U	0.191	0.192		0.207	pCi/g	11/02/20 15:15	11/26/20 12:43	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-022

Lab Sample ID: 160-40090-22

Date Collected: 10/23/20 09:12

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.410		0.123	0.130	0.200	0.0462	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Radium-228	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thallium-208	0.0308	U	0.0807	0.0808		0.0443	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium-232	0.324		0.188	0.191		0.0734	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium-234	-0.225	U	1.06	1.06		0.877	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Thorium 228	0.244		0.0919	0.0972		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Uranium-235	-0.190	U	0.563	0.563		0.327	pCi/g	11/02/20 15:15	11/26/20 12:43	1
Uranium-238	-0.225	U	1.06	1.06		0.877	pCi/g	11/02/20 15:15	11/26/20 12:43	1

Client Sample ID: HPPG-ESU-TU153C-023

Lab Sample ID: 160-40090-23

Date Collected: 10/23/20 09:13

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0638	U	0.296	0.296		0.330	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Actinium 228	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Bismuth-212	0.133	U	0.767	0.767		0.621	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Bismuth-214	0.346		0.135	0.140		0.0549	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Cesium-137	-0.00225	U	0.0506	0.0506	0.0700	0.0415	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-210	0.794	U	1.25	1.26		0.814	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-212	0.310		0.0775	0.0873		0.0409	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Lead-214	0.354		0.0845	0.0921		0.0480	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Potassium-40	8.27		1.24	1.50		0.262	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Protactinium-231	0.000	U	0.470	0.470		1.89	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Protactinium-234	0.0507	U	0.253	0.253		0.207	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Radium-226	0.346		0.135	0.140	0.200	0.0549	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Radium-228	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thallium-208	0.145		0.0526	0.0547		0.0213	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium-232	0.252		0.148	0.150		0.0792	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium-234	0.104	U	0.133	0.133		0.457	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Thorium 228	0.310		0.0775	0.0873		0.0409	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Uranium-235	0.000	U	0.188	0.188		0.347	pCi/g	11/02/20 15:15	11/26/20 12:41	1
Uranium-238	0.104	U	0.133	0.133		0.457	pCi/g	11/02/20 15:15	11/26/20 12:41	1

Client Sample ID: HPPG-ESU-TU153C-024

Lab Sample ID: 160-40090-24

Date Collected: 10/23/20 09:15

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.220	U	0.725	0.725		0.442	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Actinium 228	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Bismuth-212	-0.197	U	0.965	0.965		0.779	pCi/g	11/02/20 15:15	11/26/20 12:59	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-ESU-TU153C-024

Lab Sample ID: 160-40090-24

Date Collected: 10/23/20 09:15

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.395		0.143	0.150		0.0636	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Cesium-137	0.0370	U	0.0751	0.0752	0.0700	0.0586	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-210	0.643	U	1.33	1.34		1.05	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-212	0.347		0.0999	0.108		0.0584	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Lead-214	0.352		0.119	0.126		0.0513	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Potassium-40	9.76		1.53	1.90		0.278	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Protactinium-231	0.0000000	U	2.92	2.92		2.41	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Protactinium-234	-0.0121	U	0.0278	0.0278		0.272	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Radium-226	0.395		0.143	0.150	0.200	0.0636	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Radium-228	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thallium-208	0.215		0.0665	0.0709		0.0224	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium-232	0.652		0.210	0.223		0.0607	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium-234	0.278	U	0.258	0.260		0.815	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Thorium 228	0.347		0.0999	0.108		0.0584	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Uranium-235	-0.0113	U	0.673	0.673		0.331	pCi/g	11/02/20 15:15	11/26/20 12:59	1
Uranium-238	0.278	U	0.258	0.260		0.815	pCi/g	11/02/20 15:15	11/26/20 12:59	1

Client Sample ID: HPPG-ESU-TU153C-025

Lab Sample ID: 160-40090-25

Date Collected: 10/23/20 09:17

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.241		0.411	0.412		0.218	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Actinium 228	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Bismuth-212	0.365	U	0.671	0.672		0.504	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Bismuth-214	0.557		0.133	0.145		0.0311	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Cesium-137	-0.0606	U	0.0592	0.0595	0.0700	0.0767	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-210	1.14		1.39	1.40		0.934	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-212	0.357		0.0804	0.0886		0.0340	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Lead-214	0.432		0.108	0.117		0.0617	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Potassium-40	8.81		1.72	1.94		0.434	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Protactinium-231	0.000	U	0.302	0.302		2.20	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Protactinium-234	-0.0193	U	0.0393	0.0393		0.272	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Radium-226	0.557		0.133	0.145	0.200	0.0311	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Radium-228	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thallium-208	0.120		0.0505	0.0519		0.0174	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium-232	0.742		0.227	0.239		0.117	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium-234	-0.995	U	0.661	0.670		0.857	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Thorium 228	0.357		0.0804	0.0886		0.0340	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Uranium-235	0.181	U	0.354	0.354		0.457	pCi/g	11/02/20 15:15	11/26/20 13:44	1
Uranium-238	-0.995	U	0.661	0.670		0.857	pCi/g	11/02/20 15:15	11/26/20 13:44	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Client Sample ID: HPPG-F-017

Lab Sample ID: 160-40090-26

Date Collected: 10/23/20 08:37

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.160	U	0.453	0.453		0.303	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Actinium 228	0.311		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Bismuth-212	-0.319	U	0.794	0.795		0.629	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Bismuth-214	0.412		0.115	0.123		0.0447	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Cesium-137	0.00304	U	0.0586	0.0586	0.0700	0.0333	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Lead-210	1.19		1.57	1.57		0.933	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Lead-212	0.399		0.0880	0.102		0.0454	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Lead-214	0.384		0.0997	0.107		0.0547	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Potassium-40	6.90		1.16	1.36		0.271	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Protactinium-231	-0.356	U	2.46	2.46		2.01	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Protactinium-234	0.104	U	0.166	0.166		0.122	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Radium-226	0.412		0.115	0.123	0.200	0.0447	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Radium-228	0.311		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Thallium-208	0.156		0.0594	0.0615		0.0257	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Thorium-232	0.311		0.229	0.231		0.105	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Thorium-234	-0.372	U	0.829	0.830		0.729	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Thorium 228	0.399		0.0880	0.102		0.0454	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Uranium-235	0.156	U	0.278	0.279		0.240	pCi/g	11/02/20 15:15	11/26/20 13:48	1
Uranium-238	-0.372	U	0.829	0.830		0.729	pCi/g	11/02/20 15:15	11/26/20 13:48	1

Client Sample ID: HPPG-F-018

Lab Sample ID: 160-40090-27

Date Collected: 10/23/20 09:10

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.114	U	0.254	0.255		0.448	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Actinium 228	0.626		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Bismuth-212	-0.805	U	1.57	1.57		1.23	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Bismuth-214	0.428		0.219	0.223		0.0858	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Cesium-137	0.0219	U	0.108	0.108	0.0700	0.0868	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Lead-210	1.26		1.46	1.47		0.947	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Lead-212	0.425		0.111	0.124		0.0492	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Lead-214	0.314		0.158	0.161		0.141	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Potassium-40	8.21		1.82	2.00		0.367	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Protactinium-231	0.726	U	2.25	2.25		2.48	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Protactinium-234	-0.0179	U	0.0560	0.0560		0.217	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Radium-226	0.428		0.219	0.223	0.200	0.0858	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Radium-228	0.626		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Thallium-208	0.151		0.0740	0.0757		0.0252	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Thorium-232	0.626		0.279	0.287		0.170	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Thorium-234	-0.944	U	1.14	1.15		1.12	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Thorium 228	0.425		0.111	0.124		0.0492	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Uranium-235	0.0282	U	0.196	0.196		0.365	pCi/g	11/02/20 15:15	11/26/20 13:45	1
Uranium-238	-0.944	U	1.14	1.15		1.12	pCi/g	11/02/20 15:15	11/26/20 13:45	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A
Matrix: Solid
Analysis Batch: 490292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488460

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/06/20 11:01		11/26/20 10:48	
	86.4									

Lab Sample ID: LCS 160-488460/1-A
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	89.5									

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-487802/1-A
Matrix: Solid
Analysis Batch: 490870

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487802

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.006585	U	0.0116	0.0116	0.250	0.00722	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	-0.002731	U	0.00546	0.00547	0.100	0.00635	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.008762		0.00876	0.00879	0.250	0.00510	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/03/20 12:03		12/03/20 16:16	
	81.0									

Lab Sample ID: LCS 160-487802/2-A
Matrix: Solid
Analysis Batch: 490871

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487802

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	2.913		0.293	0.250	0.0103	pCi/g	91	84 - 120	
Uranium-238	3.26	3.199		0.317	0.250	0.00514	pCi/g	98	82 - 122	
Tracer	LCS	LCS	Limits							
Uranium-232	%Yield	Qualifier	30 - 110							
	75.9									

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-40090-1 DU
Matrix: Solid
Analysis Batch: 490876

Client Sample ID: HPPG-ESU-TU153C-001
Prep Type: Total/NA
Prep Batch: 487802

Analyte	Sample	Sample	DU		Total	LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Uranium-234	0.415		0.4794		0.0752	0.250	0.00485	pCi/g	0.45	1
Uranium-235/236	0.0294		0.02594		0.0165	0.100	0.00603	pCi/g	0.10	1
Uranium-238	0.352		0.4244		0.0693	0.250	0.00484	pCi/g	0.55	1
DU DU										
Tracer	%Yield	Qualifier	Limits							
Uranium-232	84.7		30 - 110							

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491927/1-A
Matrix: Solid
Analysis Batch: 493064

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491927

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Plutonium-238	0.0000	U	0.0130	0.0130	0.100	0.0107	pCi/g	12/15/20 12:11	12/23/20 14:28	1	
Plutonium-239/240	-0.01688	U	0.0124	0.0125	0.100	0.0138	pCi/g	12/15/20 12:11	12/23/20 14:28	1	
MB MB											
Tracer	%Yield	Qualifier	Limits				Prepared		Analyzed		Dil Fac
Pu-242 (T)	89.2		30 - 110				12/15/20 12:11		12/23/20 14:28		1

Lab Sample ID: LCS 160-491927/2-A
Matrix: Solid
Analysis Batch: 493065

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491927

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
		Result	Qual	Uncert. (2σ+/-)						
Plutonium-238	2.61	2.475		0.251	0.100	0.00459	pCi/g	95	80 - 125	
Plutonium-239/240	2.64	2.610		0.262	0.100	0.00796	pCi/g	99	81 - 125	
LCS LCS										
Tracer	%Yield	Qualifier	Limits							
Pu-242 (T)	88.4		30 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-487736/1-A
Matrix: Solid
Analysis Batch: 490289

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487736

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.2720	U	0.534	0.535		0.305	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Actinium 228	0.06904		0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Bismuth-212	0.2256	U	0.391	0.391		0.281	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Bismuth-214	-0.01411	U	0.137	0.137		0.114	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Cesium-137	0.01799	U	0.0299	0.0300	0.0700	0.0211	pCi/g	11/02/20 15:15	11/26/20 12:47	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-487736/1-A
Matrix: Solid
Analysis Batch: 490289

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487736

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Lead-210	0.0000	U	0.266	0.266		0.821	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Lead-212	-0.06622	U	0.0814	0.0819		0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Lead-214	-0.01264	U	0.0648	0.0648		0.0539	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Potassium-40	-0.1927	U	0.684	0.685		0.430	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Protactinium-231	0.0000	U	0.422	0.422		1.34	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Protactinium-234	0.1019	U	0.0770	0.0777		0.135	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Radium-226	-0.01411	U	0.137	0.137	0.200	0.114	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Radium-228	0.06904	U	0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thallium-208	-0.0008951	U	0.00144	0.00144		0.0283	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium-232	0.06904	U	0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium-234	0.1076	U	0.274	0.275		0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium 228	-0.06622	U	0.0814	0.0819		0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Uranium-235	-0.1276	U	0.343	0.343		0.277	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Uranium-238	0.1076	U	0.274	0.275		0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1

Lab Sample ID: LCS 160-487736/2-A
Matrix: Solid
Analysis Batch: 490283

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487736

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	101.2		11.9		0.535	pCi/g	105	87 - 116
Cesium-137	26.8	29.82		3.13	0.0700	0.133	pCi/g	111	87 - 120
Cobalt-60	9.53	10.35		1.09		0.0507	pCi/g	109	87 - 115

Lab Sample ID: MB 160-487745/1-A
Matrix: Solid
Analysis Batch: 490285

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487745

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.1051	U	0.286	0.286		0.242	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Actinium 228	-0.05311	U	0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Bismuth-212	0.3615	U	0.631	0.632		0.456	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Bismuth-214	-0.006509	U	0.0103	0.0103		0.133	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Cesium-137	-0.005242	U	0.0584	0.0584	0.0700	0.0473	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-210	-0.5704	U	1.34	1.35		1.13	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-212	-0.02745	U	0.0853	0.0854		0.0927	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Lead-214	0.03566	U	0.0999	0.0999		0.0779	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Potassium-40	0.02764	U	0.931	0.931		0.460	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Protactinium-231	0.0000	U	0.524	0.524		2.05	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Protactinium-234	-0.01266	U	0.0227	0.0228		0.232	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Radium-226	-0.006509	U	0.0103	0.0103	0.200	0.133	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Radium-228	-0.05311	U	0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thallium-208	0.003138	U	0.0536	0.0536		0.0330	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium-232	-0.05311	U	0.225	0.226		0.112	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium-234	-0.6595	U	0.807	0.811		0.899	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Thorium 228	-0.02745	U	0.0853	0.0854		0.0927	pCi/g	11/02/20 16:42	11/26/20 14:46	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-487745/1-A
Matrix: Solid
Analysis Batch: 490285

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487745

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-235	0.005695	U	0.0355	0.0355		0.432	pCi/g	11/02/20 16:42	11/26/20 14:46	1
Uranium-238	-0.6595	U	0.807	0.811		0.899	pCi/g	11/02/20 16:42	11/26/20 14:46	1

Lab Sample ID: LCS 160-487745/2-A
Matrix: Solid
Analysis Batch: 490282

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487745

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	93.16		11.0		0.587	pCi/g	97	87 - 116
Cesium-137	26.8	28.64		3.02	0.0700	0.106	pCi/g	107	87 - 120
Cobalt-60	9.52	9.796		1.05		0.0389	pCi/g	103	87 - 115

Lab Sample ID: 160-40090-19 DU
Matrix: Solid
Analysis Batch: 490281

Client Sample ID: HPPG-ESU-TU153C-019
Prep Type: Total/NA
Prep Batch: 487745

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Actinium-227	-0.353	U	-0.2015	U	0.665		0.401	pCi/g	0.11	1
Actinium 228	0.563		0.4406		0.223		0.196	pCi/g	0.33	1
Bismuth-212	-0.274	U	0.07032	U	1.00		0.819	pCi/g	0.20	1
Bismuth-214	0.351		0.4133		0.157		0.0629	pCi/g	0.22	1
Cesium-137	-0.0282	U	-0.03922	U	0.0693	0.0700	0.0757	pCi/g	0.09	1
Lead-210	-0.339	U	-0.07097	U	1.67		1.19	pCi/g	0.09	1
Lead-212	0.387		0.4219		0.129		0.0608	pCi/g	0.16	1
Lead-214	0.416		0.5765		0.151		0.0760	pCi/g	0.61	1
Potassium-40	8.18		8.065		1.94		0.348	pCi/g	0.03	1
Protactinium-231	-0.765	U	0.0000	U	0.664		2.19	pCi/g	0.24	1
Protactinium-234	-0.102	U	-0.1127	U	0.130		0.233	pCi/g	0.03	1
Radium-226	0.351		0.4133		0.157	0.200	0.0629	pCi/g	0.22	1
Radium-228	0.563		0.4406		0.223		0.196	pCi/g	0.33	1
Thallium-208	0.156		0.1745		0.0707		0.0223	pCi/g	0.15	1
Thorium-232	0.563		0.4406		0.223		0.196	pCi/g	0.33	1
Thorium-234	0.312	U	0.5803		0.725		0.463	pCi/g	0.17	1
Thorium 228	0.387		0.4219		0.129		0.0608	pCi/g	0.16	1
Uranium-235	0.0910	U	0.08866	U	0.224		0.365	pCi/g	0.01	1
Uranium-238	0.312	U	0.5803		0.725		0.463	pCi/g	0.17	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Rad

Leach Batch: 486973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	Dry and Grind	
160-40090-2	HPPG-ESU-TU153C-002	Total/NA	Solid	Dry and Grind	
160-40090-3	HPPG-ESU-TU153C-003	Total/NA	Solid	Dry and Grind	
160-40090-4	HPPG-ESU-TU153C-004	Total/NA	Solid	Dry and Grind	
160-40090-5	HPPG-ESU-TU153C-005	Total/NA	Solid	Dry and Grind	
160-40090-6	HPPG-ESU-TU153C-006	Total/NA	Solid	Dry and Grind	
160-40090-7	HPPG-ESU-TU153C-007	Total/NA	Solid	Dry and Grind	
160-40090-8	HPPG-ESU-TU153C-008	Total/NA	Solid	Dry and Grind	
160-40090-9	HPPG-ESU-TU153C-009	Total/NA	Solid	Dry and Grind	
160-40090-10	HPPG-ESU-TU153C-010	Total/NA	Solid	Dry and Grind	
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	Dry and Grind	
160-40090-12	HPPG-ESU-TU153C-012	Total/NA	Solid	Dry and Grind	
160-40090-13	HPPG-ESU-TU153C-013	Total/NA	Solid	Dry and Grind	
160-40090-14	HPPG-ESU-TU153C-014	Total/NA	Solid	Dry and Grind	
160-40090-15	HPPG-ESU-TU153C-015	Total/NA	Solid	Dry and Grind	
160-40090-16	HPPG-ESU-TU153C-016	Total/NA	Solid	Dry and Grind	
160-40090-17	HPPG-ESU-TU153C-017	Total/NA	Solid	Dry and Grind	
160-40090-18	HPPG-ESU-TU153C-018	Total/NA	Solid	Dry and Grind	
160-40090-19	HPPG-ESU-TU153C-019	Total/NA	Solid	Dry and Grind	
160-40090-20	HPPG-ESU-TU153C-020	Total/NA	Solid	Dry and Grind	
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	Dry and Grind	
160-40090-22	HPPG-ESU-TU153C-022	Total/NA	Solid	Dry and Grind	
160-40090-23	HPPG-ESU-TU153C-023	Total/NA	Solid	Dry and Grind	
160-40090-24	HPPG-ESU-TU153C-024	Total/NA	Solid	Dry and Grind	
160-40090-1 DU	HPPG-ESU-TU153C-001	Total/NA	Solid	Dry and Grind	
160-40090-19 DU	HPPG-ESU-TU153C-019	Total/NA	Solid	Dry and Grind	

Leach Batch: 486980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-25	HPPG-ESU-TU153C-025	Total/NA	Solid	Dry and Grind	
160-40090-26	HPPG-F-017	Total/NA	Solid	Dry and Grind	
160-40090-27	HPPG-F-018	Total/NA	Solid	Dry and Grind	

Prep Batch: 487736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-20	HPPG-ESU-TU153C-020	Total/NA	Solid	Fill_Geo-21	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	Fill_Geo-21	486973
160-40090-22	HPPG-ESU-TU153C-022	Total/NA	Solid	Fill_Geo-21	486973
160-40090-23	HPPG-ESU-TU153C-023	Total/NA	Solid	Fill_Geo-21	486973
160-40090-24	HPPG-ESU-TU153C-024	Total/NA	Solid	Fill_Geo-21	486973
160-40090-25	HPPG-ESU-TU153C-025	Total/NA	Solid	Fill_Geo-21	486980
160-40090-26	HPPG-F-017	Total/NA	Solid	Fill_Geo-21	486980
160-40090-27	HPPG-F-018	Total/NA	Solid	Fill_Geo-21	486980
MB 160-487736/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487736/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 487745

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	Fill_Geo-21	486973
160-40090-2	HPPG-ESU-TU153C-002	Total/NA	Solid	Fill_Geo-21	486973
160-40090-3	HPPG-ESU-TU153C-003	Total/NA	Solid	Fill_Geo-21	486973

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
 SDG: GJ46599778

Rad (Continued)

Prep Batch: 487745 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-4	HPPG-ESU-TU153C-004	Total/NA	Solid	Fill_Geo-21	486973
160-40090-5	HPPG-ESU-TU153C-005	Total/NA	Solid	Fill_Geo-21	486973
160-40090-6	HPPG-ESU-TU153C-006	Total/NA	Solid	Fill_Geo-21	486973
160-40090-7	HPPG-ESU-TU153C-007	Total/NA	Solid	Fill_Geo-21	486973
160-40090-8	HPPG-ESU-TU153C-008	Total/NA	Solid	Fill_Geo-21	486973
160-40090-9	HPPG-ESU-TU153C-009	Total/NA	Solid	Fill_Geo-21	486973
160-40090-10	HPPG-ESU-TU153C-010	Total/NA	Solid	Fill_Geo-21	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	Fill_Geo-21	486973
160-40090-12	HPPG-ESU-TU153C-012	Total/NA	Solid	Fill_Geo-21	486973
160-40090-13	HPPG-ESU-TU153C-013	Total/NA	Solid	Fill_Geo-21	486973
160-40090-14	HPPG-ESU-TU153C-014	Total/NA	Solid	Fill_Geo-21	486973
160-40090-15	HPPG-ESU-TU153C-015	Total/NA	Solid	Fill_Geo-21	486973
160-40090-16	HPPG-ESU-TU153C-016	Total/NA	Solid	Fill_Geo-21	486973
160-40090-17	HPPG-ESU-TU153C-017	Total/NA	Solid	Fill_Geo-21	486973
160-40090-18	HPPG-ESU-TU153C-018	Total/NA	Solid	Fill_Geo-21	486973
160-40090-19	HPPG-ESU-TU153C-019	Total/NA	Solid	Fill_Geo-21	486973
MB 160-487745/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487745/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40090-19 DU	HPPG-ESU-TU153C-019	Total/NA	Solid	Fill_Geo-21	486973

Prep Batch: 487802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	ExtChrom	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	ExtChrom	486973
MB 160-487802/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-487802/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40090-1 DU	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	DPS-0	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	DPS-0	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	DPS-0	486973
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 491927

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40090-1	HPPG-ESU-TU153C-001	Total/NA	Solid	ExtChrom	486973
160-40090-11	HPPG-ESU-TU153C-011	Total/NA	Solid	ExtChrom	486973
160-40090-21	HPPG-ESU-TU153C-021	Total/NA	Solid	ExtChrom	486973
MB 160-491927/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-491927/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40090-1
SDG: GJ46599778

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40090-1	HPPG-ESU-TU153C-001	88.5	
160-40090-11	HPPG-ESU-TU153C-011	91.9	
160-40090-21	HPPG-ESU-TU153C-021	75.2	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	
Tracer/Carrier Legend			
Sr = Sr Carrier			

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40090-1	HPPG-ESU-TU153C-001	87.6	
160-40090-11	HPPG-ESU-TU153C-011	91.1	
160-40090-21	HPPG-ESU-TU153C-021	82.9	
LCS 160-491927/2-A	Lab Control Sample	88.4	
MB 160-491927/1-A	Method Blank	89.2	
Tracer/Carrier Legend			
Pu-242 (T) = Pu-242 (T)			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

			Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40090-1	HPPG-ESU-TU153C-001	80.8	
160-40090-1 DU	HPPG-ESU-TU153C-001	84.7	
160-40090-11	HPPG-ESU-TU153C-011	84.6	
160-40090-21	HPPG-ESU-TU153C-021	79.8	
LCS 160-487802/2-A	Lab Control Sample	75.9	
MB 160-487802/1-A	Method Blank	81.0	
Tracer/Carrier Legend			
U-232 = Uranium-232			



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40094-1
Laboratory Sample Delivery Group: D1189468
Client Project/Site: HPNS-Parcel G 501197
Revision: 3

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/13/2021 3:28:21 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

Job ID: 160-40094-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40094-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Removing radium 226 by alpha spec to job series 2 per request.

Revision 2- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

Job ID: 160-40094-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.9 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/28/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU153C-B-001 (160-40094-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488774/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report. HPPG-ESU-TU153C-B-001 (160-40094-1), (LCS 160-488774/2-A), (MB 160-488774/1-A) and (160-40094-A-1-K DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488775/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report. HPPG-ESU-TU153C-B-001 (160-40094-1), (LCS 160-488775/2-A), (MB 160-488775/1-A) and (160-40094-A-1-J DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU153C-B-001 (160-40094-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/28/2020, prepared on 11/04/2020 and analyzed on 12/02/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

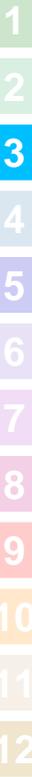
Job ID: 160-40094-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-488209 is within limits and is stored in the level IV raw data. (MB 160-488209/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-018

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4395
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Re-226 by Alpha spec, Isotopic U (234, 235/6, 238)	Isotopic Pu (238, 239/240)				
HPPG-ESU-TU153C-B-001	10/23/2020	13:03	G	SO	1	16 oz. plastic jar	X	X	X	X	4	D1189468		
						Preservatives (water)								
						Preservatives (soil)								

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:28	SHIPPED TO LAB via FE		10/26/2020 08:38

*** Last 3 transfers shown above - Complete list of transfers on last page ***



160-40094 Chain of Custody



All Transfers for COC 501197RSY-018

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/23/2020 14:28	SHIPPED TO LAB via FE	Michael King	10/26/2020 08:38



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40094-1

SDG Number: D1189468

Login Number: 40094**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
SDG: D1189468

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40094-1	HPPG-ESU-TU153C-B-001	Solid	10/23/20 13:03	10/26/20 08:38	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
 SDG: D1189468

Client Sample ID: HPPG-ESU-TU153C-B-001

Lab Sample ID: 160-40094-1

Date Collected: 10/23/20 13:03

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.00953	U	0.0641	0.0641	0.160	0.0534	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.3		40 - 110					11/06/20 11:01	11/26/20 10:48	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0258		0.0228	0.0229	0.100	0.0146	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.0218		0.0154	0.0155	0.100	0.00653	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	84.5		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.393		0.0583	0.0670	0.250	0.00695	pCi/g	11/10/20 17:08	12/07/20 15:15	1
Uranium-235/236	0.0210		0.0166	0.0167	0.100	0.00612	pCi/g	11/10/20 17:08	12/07/20 15:15	1
Uranium-238	0.371		0.0560	0.0641	0.250	0.00491	pCi/g	11/10/20 17:08	12/07/20 15:15	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	83.8		30 - 110					11/10/20 17:08	12/07/20 15:15	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.484		0.159	0.167		0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Actinium-227	-0.301	U	0.498	0.499		0.356	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Bismuth-212	0.441	U	0.883	0.884		0.697	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Bismuth-214	0.395		0.106	0.114		0.0408	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Cesium-137	-0.0202	U	0.0516	0.0516	0.0700	0.0406	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-210	0.488	U	1.08	1.08		0.763	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-212	0.363		0.0762	0.0895		0.0339	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Lead-214	0.438		0.0932	0.104		0.0469	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Potassium-40	8.77		1.42	1.68		0.418	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Protactinium-231	0.661	U	2.41	2.41		1.96	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Protactinium-234	0.0491	U	0.163	0.163		0.224	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Radium-226	0.395		0.106	0.114	0.200	0.0408	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Radium-228	0.484		0.159	0.167		0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thallium-208	0.123		0.0623	0.0636		0.0293	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium 228	0.363		0.0762	0.0895		0.0339	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium-232	0.484		0.159	0.167		0.111	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Thorium-234	0.581		0.631	0.635		0.413	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Uranium-235	0.0806	U	0.201	0.202		0.354	pCi/g	11/04/20 13:46	12/02/20 13:32	1
Uranium-238	0.581		0.631	0.635		0.413	pCi/g	11/04/20 13:46	12/02/20 13:32	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
 SDG: D1189468

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A
Matrix: Solid
Analysis Batch: 490292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488460

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/06/20 11:01		11/26/20 10:48	
	86.4									

Lab Sample ID: LCS 160-488460/1-A
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	89.5									

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-488775/1-A
Matrix: Solid
Analysis Batch: 491105

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488775

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.0000	U	0.0152	0.0152	0.250	0.0125	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.002733	U	0.00947	0.00947	0.100	0.00636	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	-0.002192	U	0.0181	0.0181	0.250	0.0153	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/10/20 17:08		12/07/20 15:14	
	81.2									

Lab Sample ID: LCS 160-488775/2-A
Matrix: Solid
Analysis Batch: 491106

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488775

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	3.300		0.328	0.250	0.0121	pCi/g	104	84 - 120	
Uranium-238	3.26	3.432		0.339	0.250	0.00541	pCi/g	105	82 - 122	
Tracer	LCS	LCS	Limits							
Uranium-232	%Yield	Qualifier	30 - 110							
	78.7									

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
 SDG: D1189468

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-40094-1 DU
Matrix: Solid
Analysis Batch: 491115

Client Sample ID: HPPG-ESU-TU153C-B-001
Prep Type: Total/NA
Prep Batch: 488775

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Uranium-234	0.393		0.4388		0.0712	0.250	0.00950	pCi/g	0.33		1
Uranium-235/236	0.0210		0.02286		0.0184	0.100	0.00835	pCi/g	0.05		1
Uranium-238	0.371		0.4134		0.0679	0.250	0.00474	pCi/g	0.32		1
DU DU											
Tracer	%Yield	Qualifier	Limits								
Uranium-232	81.9		30 - 110								

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-488774/1-A
Matrix: Solid
Analysis Batch: 491103

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488774

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil	Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Plutonium-238	0.005594	U	0.0194	0.0194	0.100	0.0150	pCi/g	11/10/20 16:55	12/07/20 15:19		1
Plutonium-239/240	0.003733	U	0.00747	0.00747	0.100	0.00434	pCi/g	11/10/20 16:55	12/07/20 15:19		1
MB MB											
Tracer	%Yield	Qualifier	Limits			Prepared	Analyzed	Dil Fac			
Pu-242 (T)	92.5		30 - 110			11/10/20 16:55	12/07/20 15:19	1			

Lab Sample ID: LCS 160-488774/2-A
Matrix: Solid
Analysis Batch: 491099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488774

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec	Limits	
		Result	Qual	Uncert. (2σ+/-)							
Plutonium-238	2.61	2.527		0.255	0.100	0.0205	pCi/g	97	80 - 125		
Plutonium-239/240	2.64	2.457		0.248	0.100	0.00633	pCi/g	93	81 - 125		
LCS LCS											
Tracer	%Yield	Qualifier	Limits								
Pu-242 (T)	97.3		30 - 110								

Lab Sample ID: 160-40094-1 DU
Matrix: Solid
Analysis Batch: 491109

Client Sample ID: HPPG-ESU-TU153C-B-001
Prep Type: Total/NA
Prep Batch: 488774

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Plutonium-238	0.0258		0.01815		0.0135	0.100	0.00469	pCi/g	0.21		1
Plutonium-239/240	0.0218		0.002019	U	0.00404	0.100	0.00470	pCi/g	1.01		1
DU DU											
Tracer	%Yield	Qualifier	Limits								
Pu-242 (T)	87.6		30 - 110								

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
 SDG: D1189468

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488209/1-A
Matrix: Solid
Analysis Batch: 490647

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488209

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Actinium-227	0.01440	U	0.451	0.451		0.280	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Bismuth-212	0.0000	U	0.189	0.189		0.383	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Bismuth-214	0.01315	U	0.147	0.147		0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Cesium-137	-0.02984	U	0.0378	0.0379	0.0700	0.0533	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-210	1.586		1.34	1.36		0.890	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-212	0.009318	U	0.101	0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-214	0.01598	U	0.107	0.107		0.0856	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Potassium-40	-0.1967	U	0.997	0.997		0.304	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Protactinium-231	0.0000	U	0.158	0.158		1.98	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Protactinium-234	0.01447	U	0.0320	0.0320		0.216	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-226	0.01315	U	0.147	0.147	0.200	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-228	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thallium-208	-0.004688	U	0.00594	0.00596		0.0547	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium 228	0.009318	U	0.101	0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium-232	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium-234	-0.5789	U	0.465	0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Uranium-235	0.06692	U	0.212	0.212		0.348	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Uranium-238	-0.5789	U	0.465	0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1

Lab Sample ID: LCS 160-488209/2-A
Matrix: Solid
Analysis Batch: 490648

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488209

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	98.24		10.3		0.585	pCi/g	102	87 - 116
Cesium-137	26.7	26.94		2.91	0.0700	0.128	pCi/g	101	87 - 120
Cobalt-60	9.50	9.522		1.03		0.0428	pCi/g	100	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40094-1
 SDG: D1189468

Rad

Leach Batch: 487040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Dry and Grind	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488209/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488209/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	DPS-0	487040
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 488774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040
MB 160-488774/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488774/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040

Prep Batch: 488775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40094-1	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040
MB 160-488775/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488775/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	Total/NA	Solid	ExtChrom	487040

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197Job ID: 160-40094-1
SDG: D1189468

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40094-1	HPPG-ESU-TU153C-B-001	90.3	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	

Tracer/Carrier Legend
Sr = Sr Carrier

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40094-1	HPPG-ESU-TU153C-B-001	84.5	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	87.6	
LCS 160-488774/2-A	Lab Control Sample	97.3	
MB 160-488774/1-A	Method Blank	92.5	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40094-1	HPPG-ESU-TU153C-B-001	83.8	
160-40094-1 DU	HPPG-ESU-TU153C-B-001	81.9	
LCS 160-488775/2-A	Lab Control Sample	78.7	
MB 160-488775/1-A	Method Blank	81.2	

Tracer/Carrier Legend
U-232 = Uranium-232

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 39 Use 1	Soil Origin: TU-108A SFU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 02/12/2021

Systematic Soil Sample Data: RSY 39 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU108A-001	1	Systematic	9,418	15,359	0.312	-0.0223	-0.0138
HPPG-SFU-TU108A-002	2	Systematic	9,674	15,359	0.365	0.0116	N/A
HPPG-SFU-TU108A-003	3	Systematic	9,803	15,359	0.487	0.00960	N/A
HPPG-SFU-TU108A-004	4	Systematic	7,923	15,359	0.0240	-0.0261	N/A
HPPG-SFU-TU108A-005	5	Systematic	9,991	15,359	0.326	0.0141	N/A
HPPG-SFU-TU108A-006	6	Systematic	9,926	15,359	0.418	-0.0304	N/A
HPPG-SFU-TU108A-007	7	Systematic	9,904	15,359	0.267	-0.0319	N/A
HPPG-SFU-TU108A-008	8	Systematic	8,773	15,359	0.187	0.0196	N/A
HPPG-SFU-TU108A-009	9	Systematic	9,260	15,359	0.266	0.0209	N/A
HPPG-SFU-TU108A-010	10	Systematic	9,002	15,359	0.0576	0.0303	N/A
HPPG-SFU-TU108A-011	11	Systematic	9,393	15,359	0.219	0.0121	-0.0226
HPPG-SFU-TU108A-012	12	Systematic	9,795	15,359	0.265	0.0245	N/A
HPPG-SFU-TU108A-013	13	Systematic	9,871	15,359	0.279	-0.0342	N/A
HPPG-SFU-TU108A-014	14	Systematic	9,163	15,359	0.314	0.00808	N/A
HPPG-SFU-TU108A-015	15	Systematic	9,415	15,359	0.271	0.0233	N/A
HPPG-SFU-TU108A-016	16	Systematic	8,881	15,359	0.244	0.0107	N/A
HPPG-SFU-TU108A-017	17	Systematic	8,647	15,359	0.322	-0.0410	N/A
HPPG-SFU-TU108A-018	18	Systematic	9,052	15,359	0.286	-0.0222	N/A
HPPG-SFU-TU108A-019	19	Systematic	9,730	15,359	0.324	-0.00498	N/A
HPPG-SFU-TU108A-020	20	Systematic	9,132	15,359	0.250	0.00194	N/A
HPPG-SFU-TU108A-021	21	Systematic	9,382	15,359	0.0543	-0.0217	0.0302
HPPG-SFU-TU108A-022	22	Systematic	8,960	15,359	0.318	-0.0493	N/A
HPPG-SFU-TU108A-023	23	Systematic	9,701	15,359	0.424	0.0196	N/A
HPPG-SFU-TU108A-024	24	Systematic	9,390	15,359	0.367	-0.0334	N/A
HPPG-SFU-TU108A-025	25	Systematic	9,219	15,359	0.228	0.0180	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Maximum					0.487	0.0303	0.0302
Mean					0.275	-0.00370	-0.0021
Median					0.279	0.00810	-0.0138
Minimum					0.0240	-0.0493	-0.0226
Standard Deviation					0.11	0.0246	N/A

Biased Soil Sample Data: RSY 39 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU108A-B-001	1	Biased	9,889	15,658	0.354	-0.0404	-0.0276

CPM Counts per minute
pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11202020-PG-ROV-329	11/20/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11212020-PG-JSS-333	11/21/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11232020-PG-JSS-339	11/23/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11232020-PG-JSS-337	11/23/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 39 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 36 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 36 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-49. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 50-85). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for ⁹⁰Sr. Strontium-90 results are also included in the TestAmerica sample results report (pages 50-85). Samples HPPG-F-043 and HPPG-F-044 are field duplicates, correlating to systematic samples -014 and -023. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 86-100). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 39 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-108A SFU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-108.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-39-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	1.00	26.05	12.39	12.03	3.59
ROI-06	50.10	127.28	85.11	85.18	10.05
ROI-07	38.08	101.21	66.34	66.14	8.71
ROI-08	73.15	150.30	107.07	107.22	11.47
ROI-10	1,866.77	2,464.33	2,176.50	2,180.52	97.53

Statistical Summary Reference Background

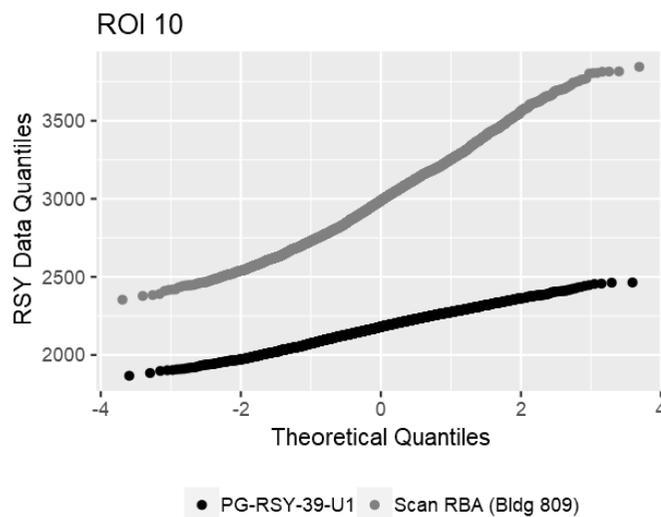
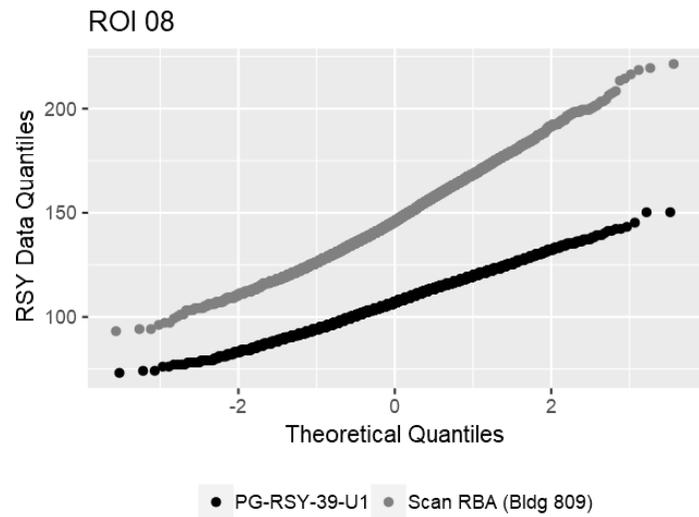
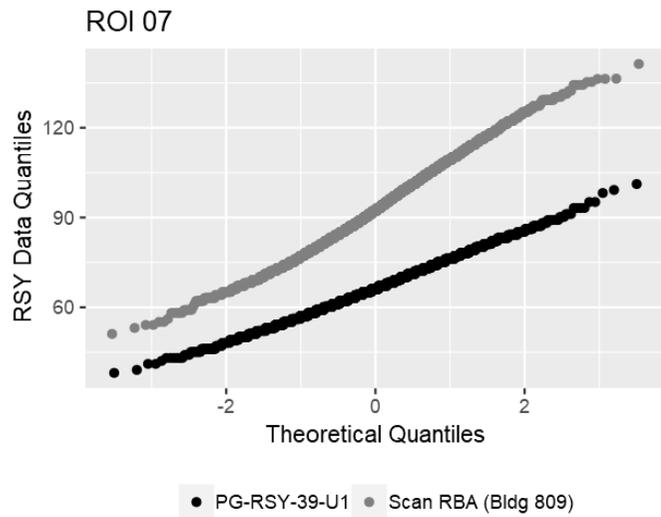
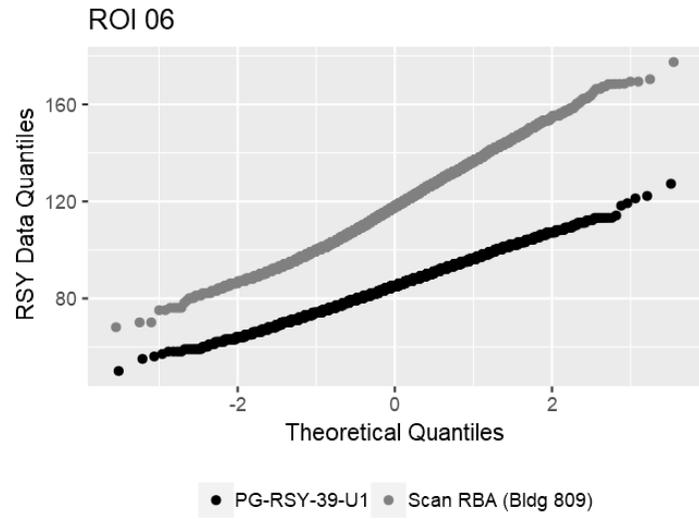
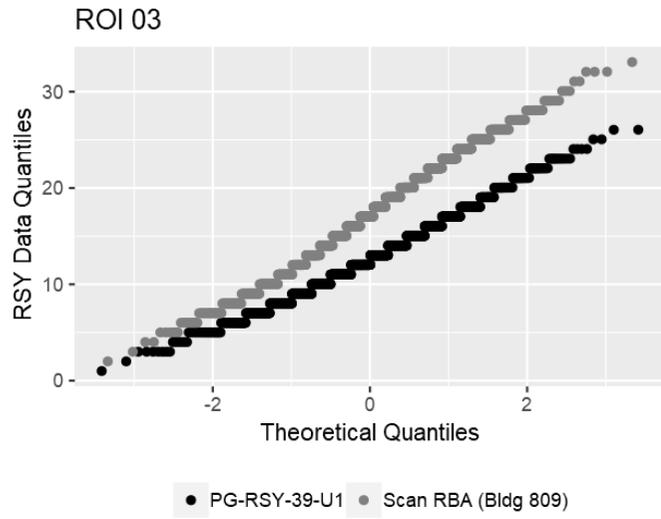
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-39-U1	3180
Scan RBA (Bldg 809)	4632

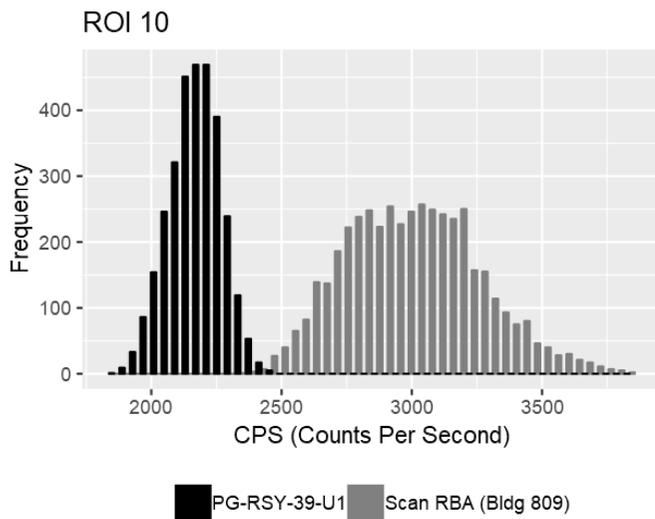
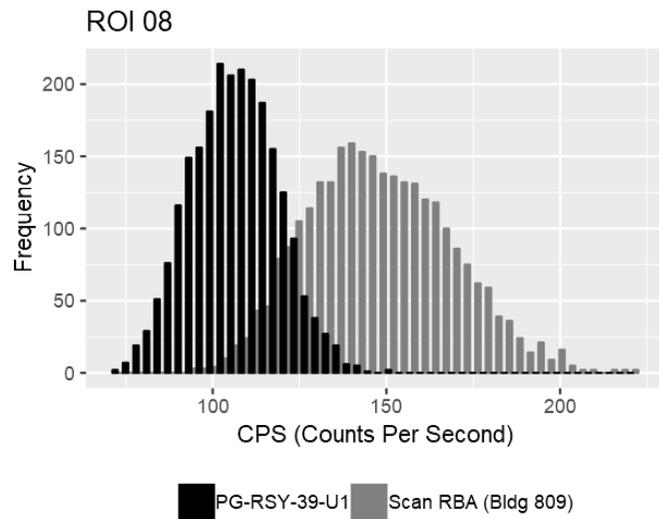
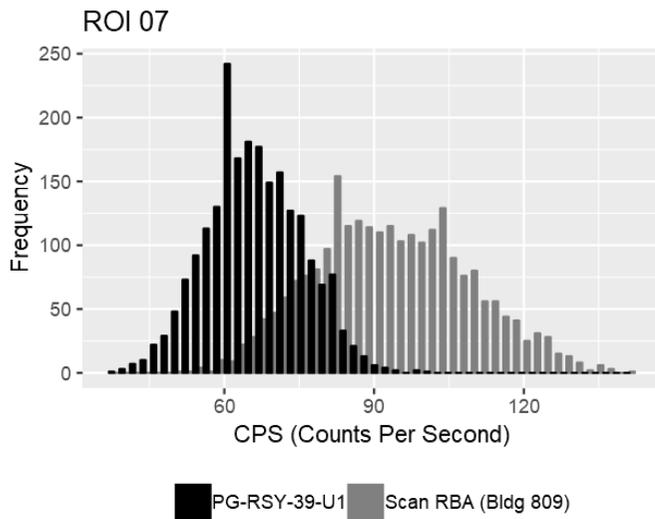
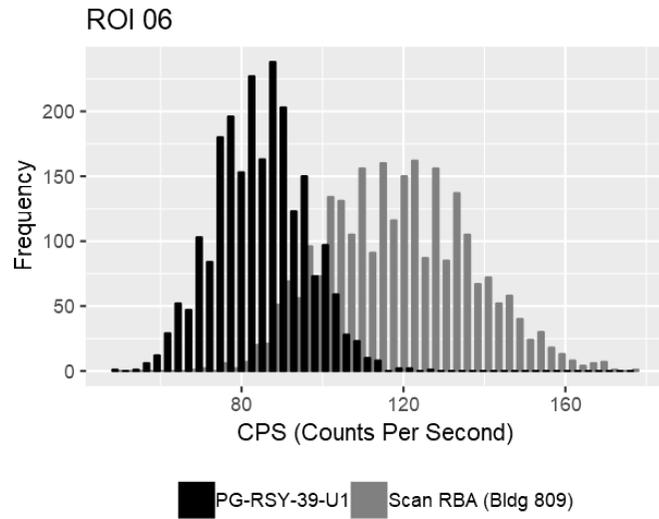
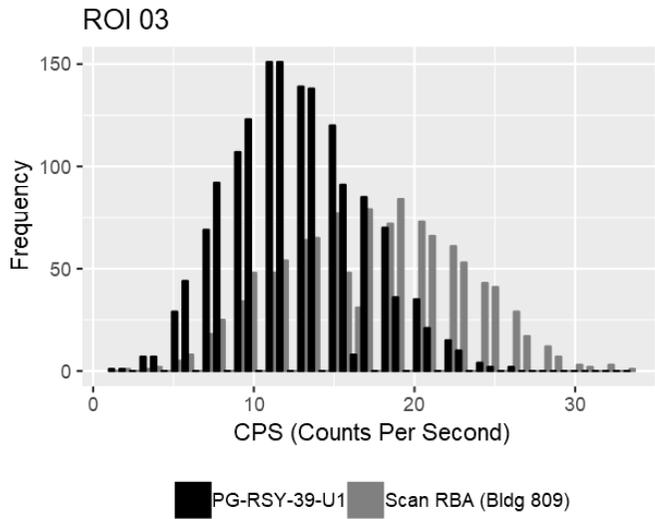
Soil Scan Statistics

Normal Q-Q Plots



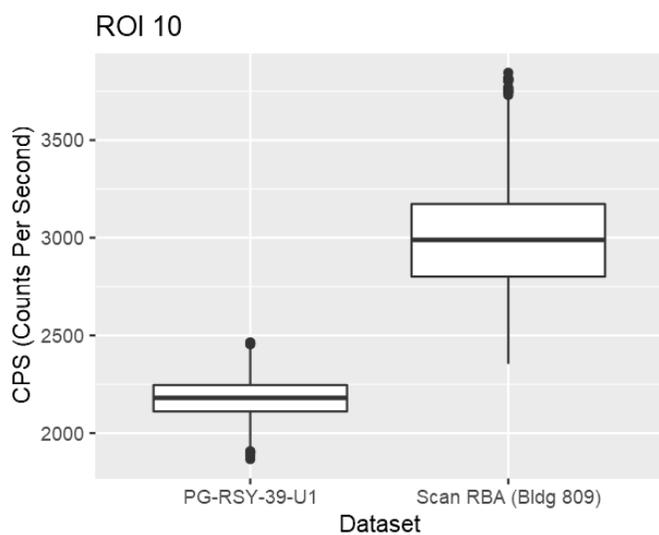
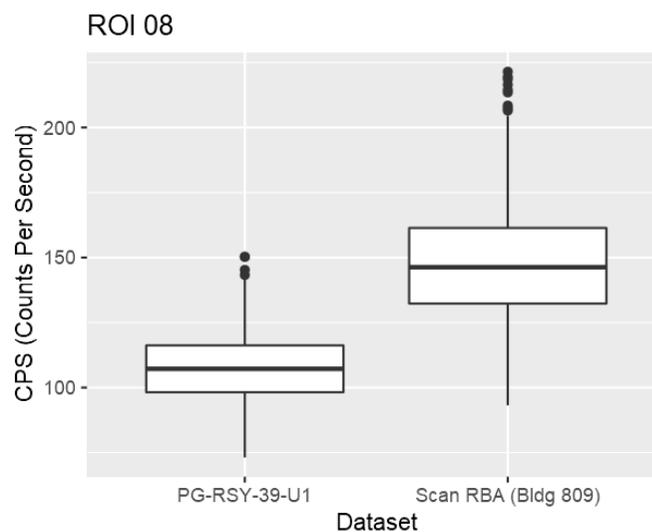
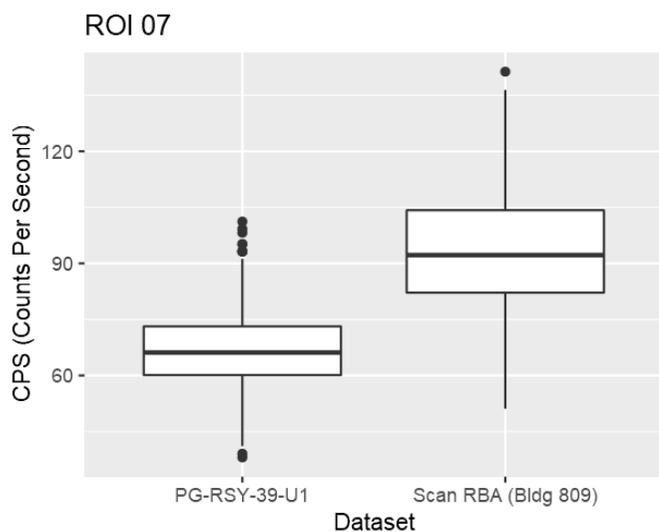
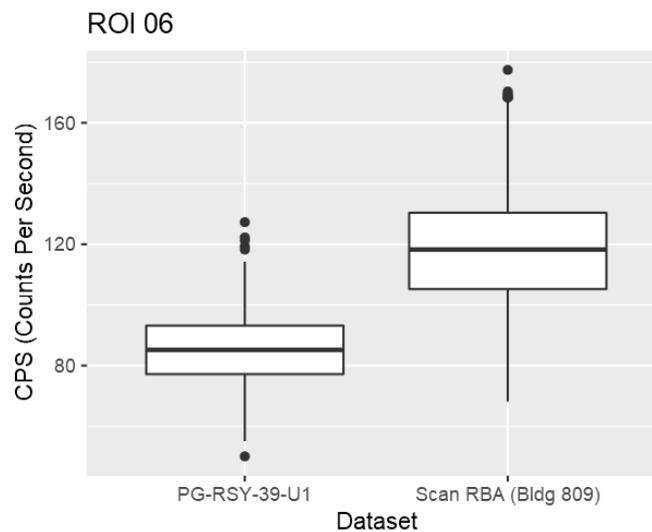
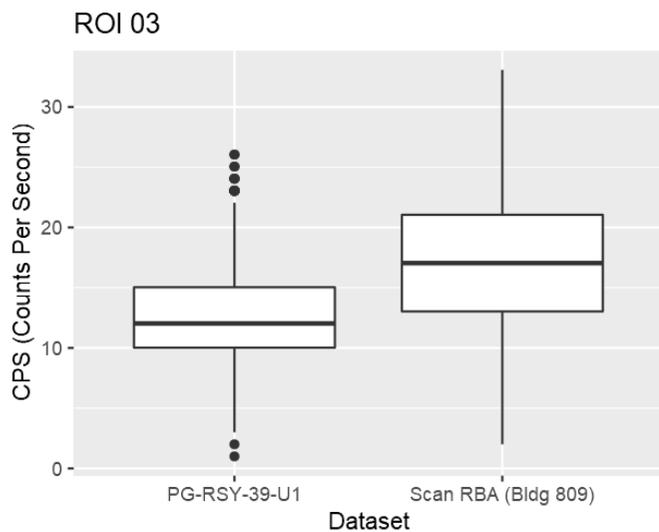
Soil Scan Statistics

Histograms



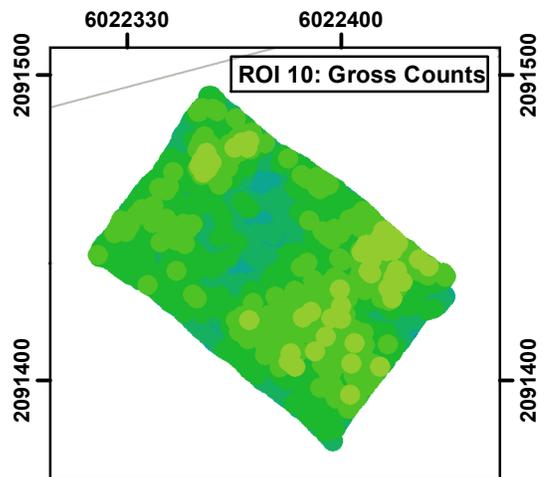
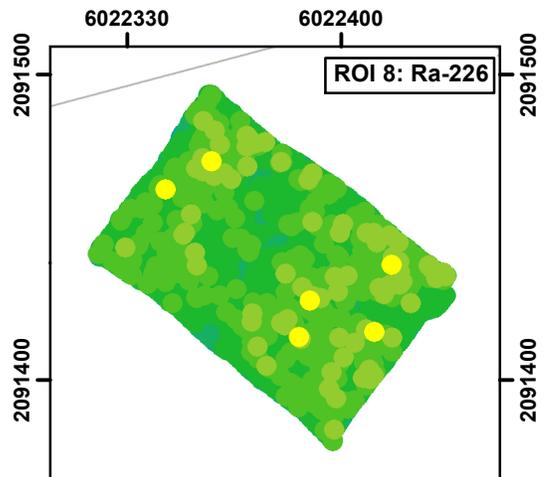
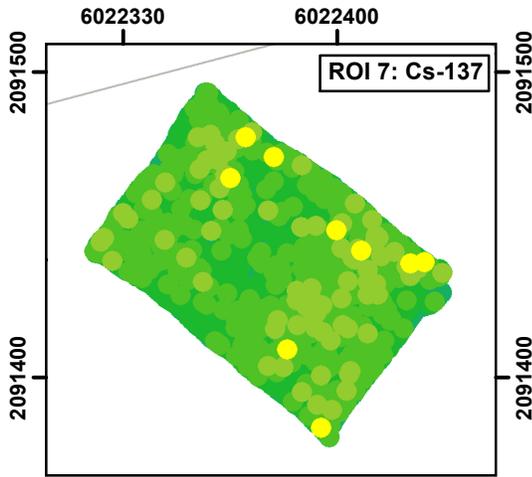
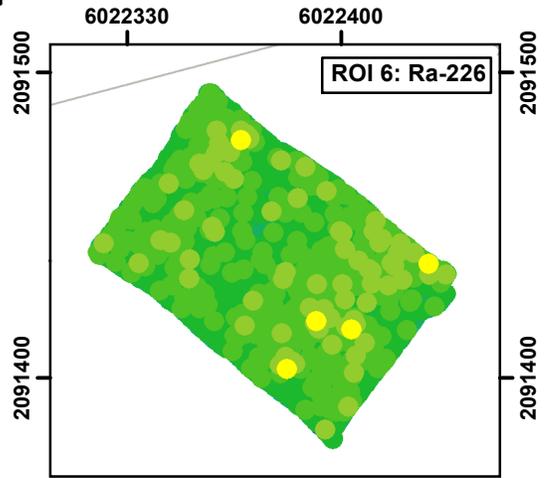
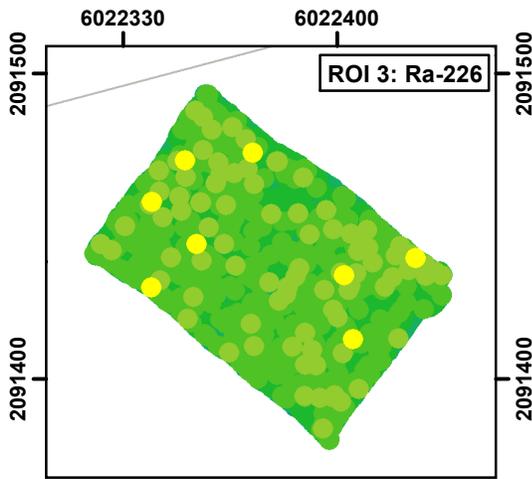
Soil Scan Statistics

Box Plots



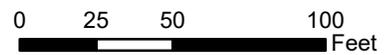
RSI Data Plots
HPNS Parcel G
RSY 39 Use 1

TU-108A SFU



RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|----------------------|------------------------|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

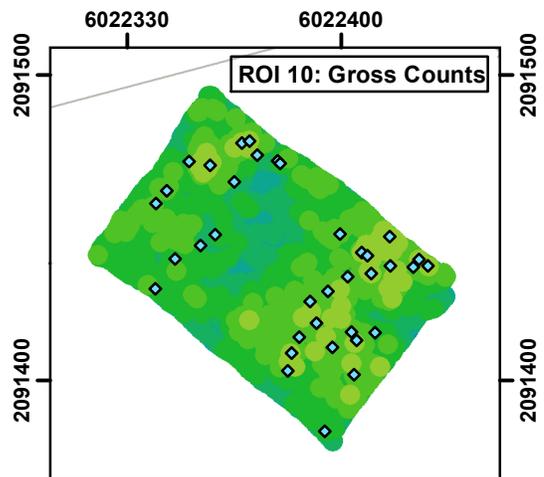
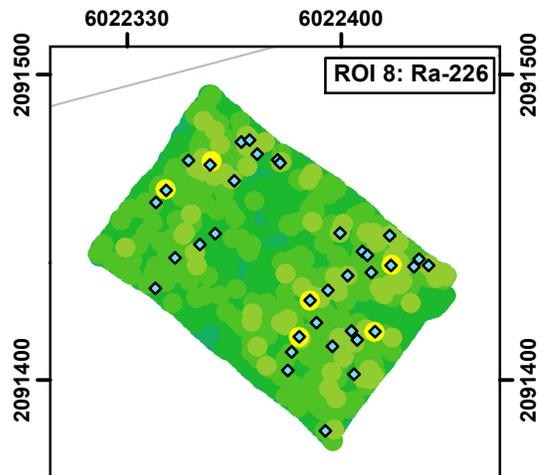
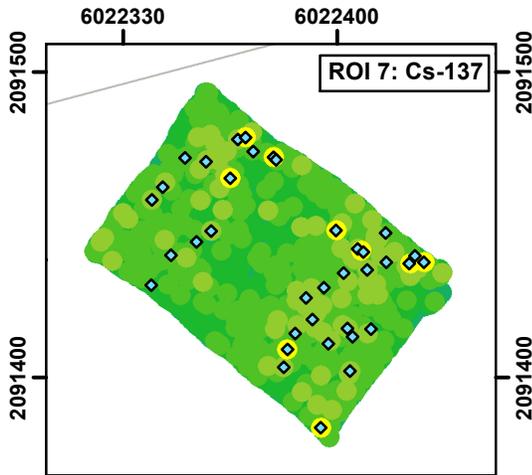
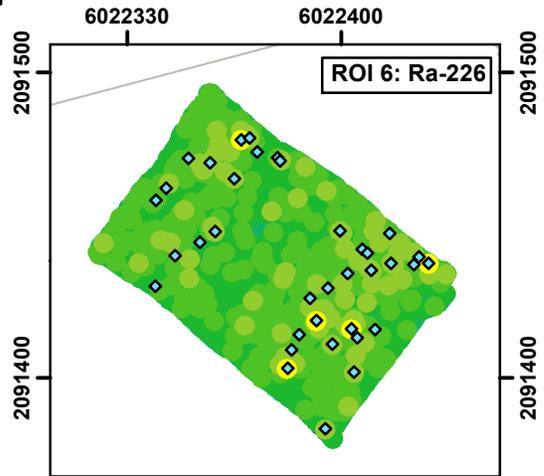
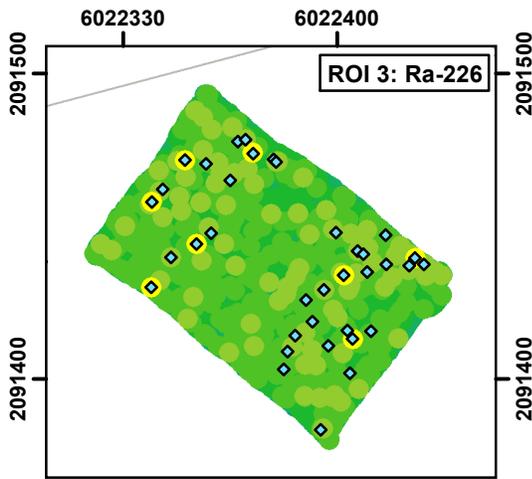


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 39 Use 1

TU-108A SFU



RS 700 Gamma Walkover Survey Data (VD1)

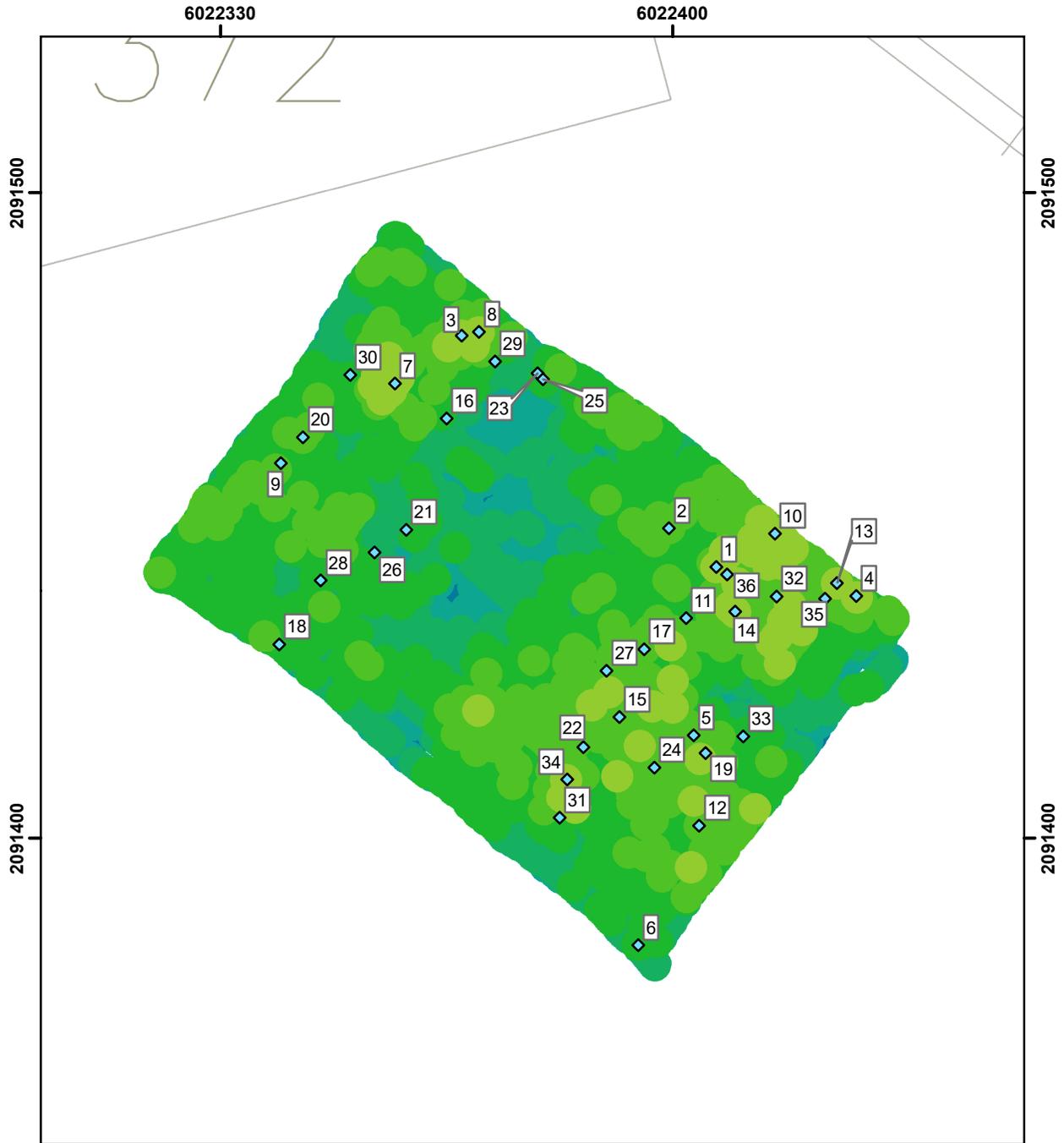
◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Follow-Up Static Survey
HPNS Parcel G
RSY 39 Use 1

TU-108A SFU



RSY 39 Use 1 (VD1, ROI 10 Gross Gamma)

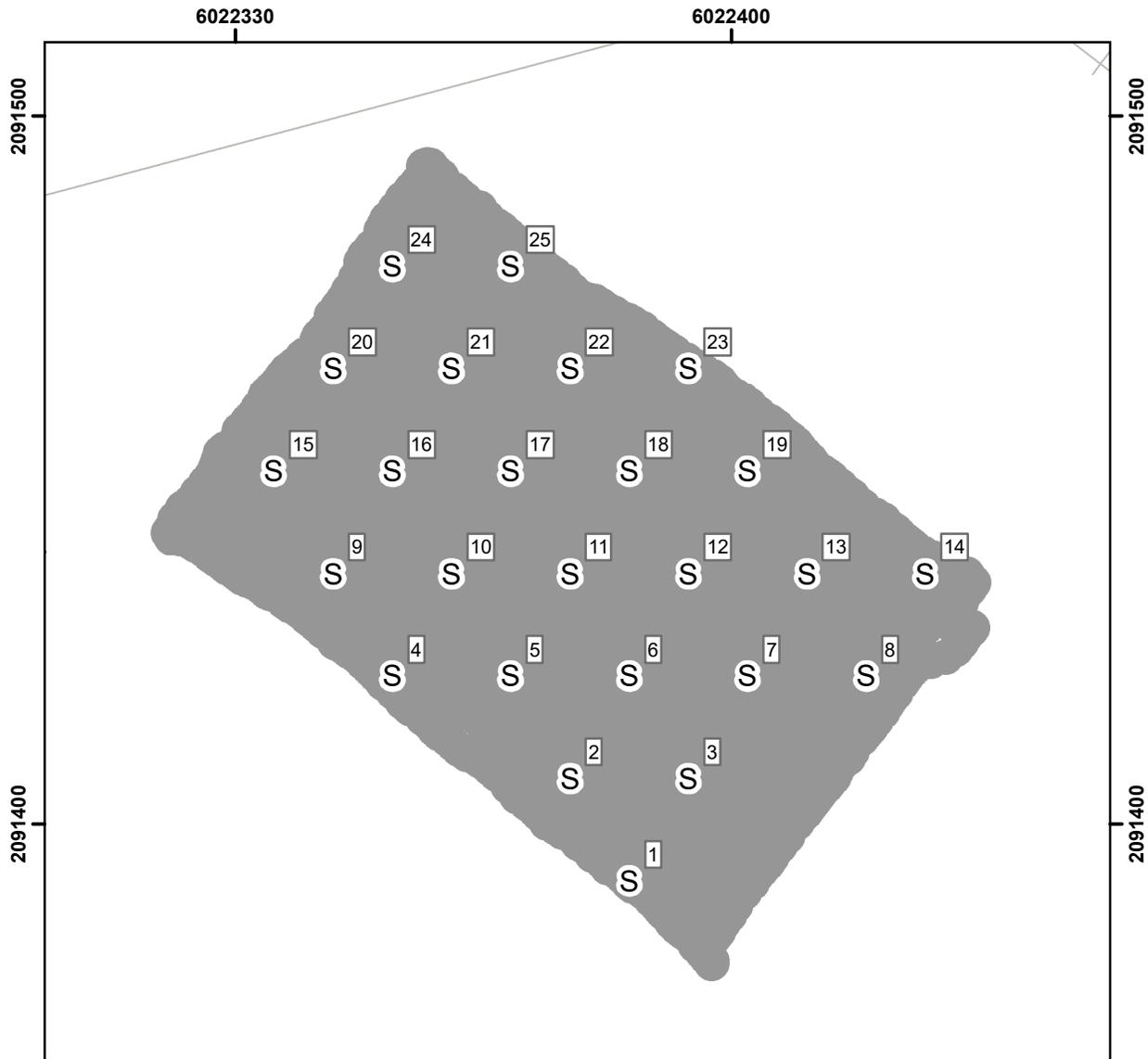
◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

**Systematic Sampling
HPNS Parcel G
RSY 39 Use 1**

TU-108A SFU



RSY 39 Use 1

- S** Systematic Sample Locations
- RS-700 GWS Coverage

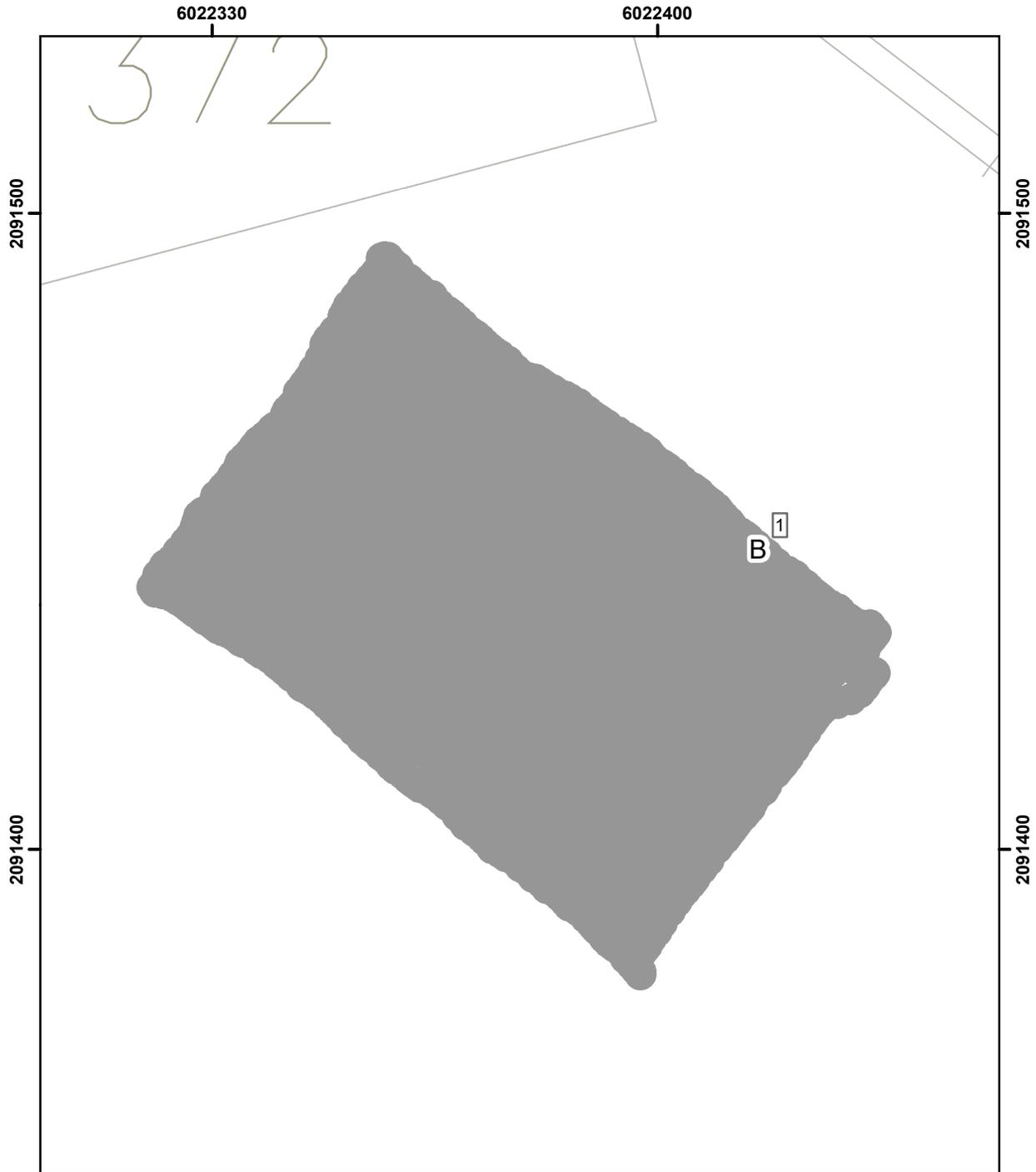
0 10 20 40 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

The block contains a scale bar from 0 to 40 feet, the coordinate system information, a north arrow, and the APTIM logo.

Biased Sampling
HPNS Parcel G
RSY 39 Use 1

TU-108A SFU



RSY 39 Use 1

- B** Biased Sample Location
- RS-700 GWS Coverage

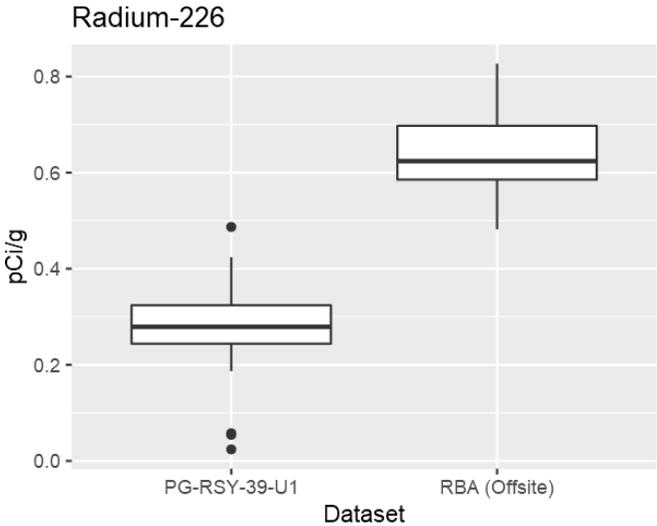
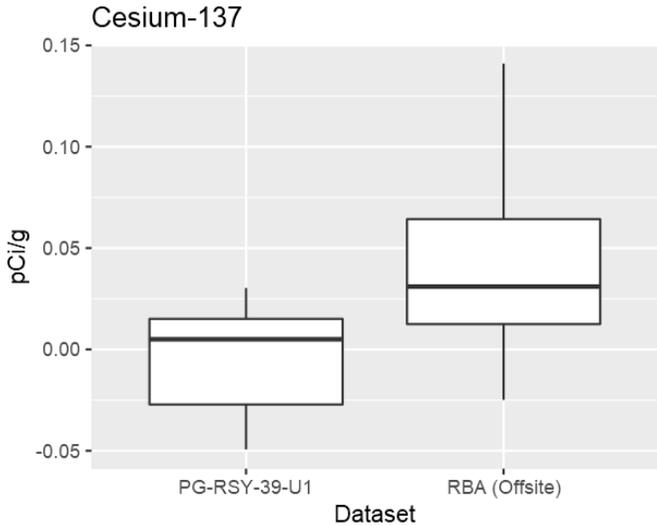
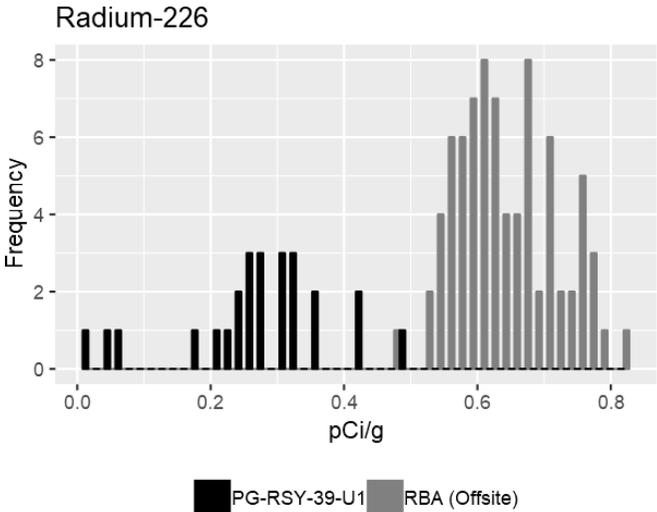
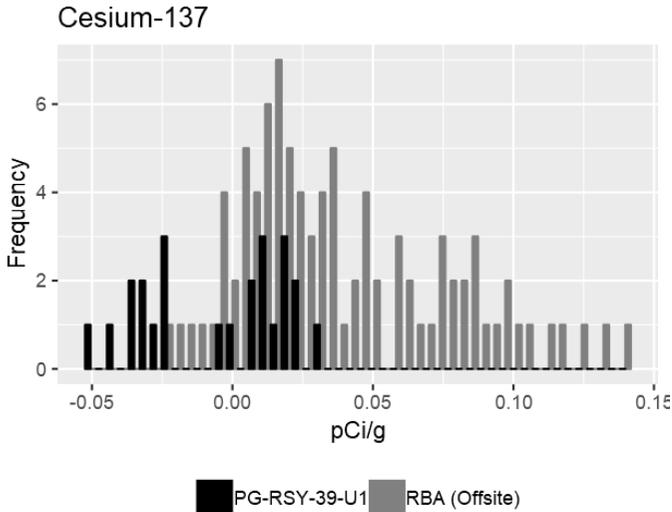
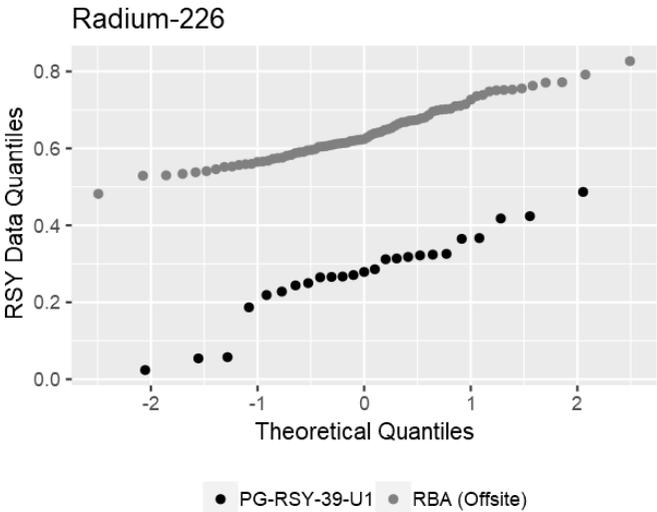
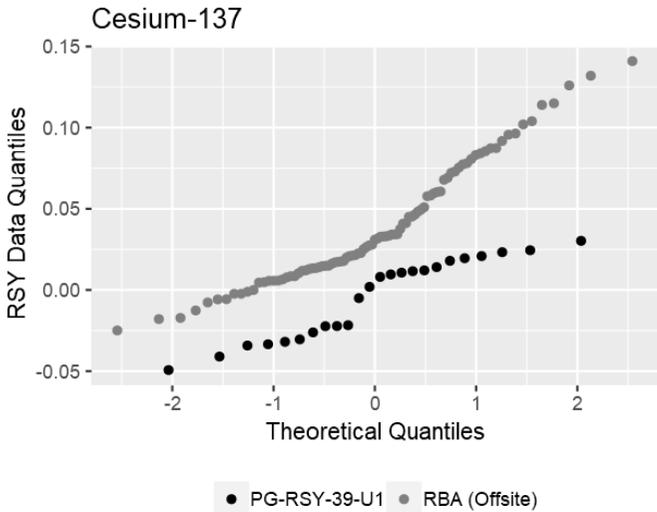
25 12.5 0 25 Feet



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Ra-226** Location: **RSY 39 Use 1**
 LBGR: **0.279** pCi/g

DOGL: **1**
 LBGR = **Median SU Data**
 LBGR = **0.279**

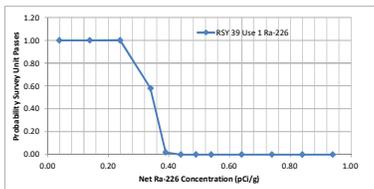
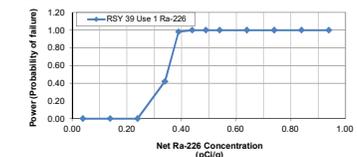
POWER CURVE CALCULATION

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	58	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	28	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.556	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.558	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	58	0	37.5	R
0.64	R	0.643	84	0	39	R
0.55	R	0.553	34	0	40	R
0.75	R	0.751	116.5	0	41	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	43	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.589	104	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	28	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.72	R	0.72	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.312	S	0.033	15	15	101	R
0.385	S	0.086	21	21	102.5	R
0.487	S	0.208	25	25	102.5	R
0.024	S	-0.255	1	1	104	R
0.386	S	0.047	20	20	105	R
0.418	S	0.139	23	23	106	R
0.287	S	-0.012	11	11	107	R
0.187	S	-0.092	4	4	108	R
0.266	S	-0.013	10	10	109	R
0.0976	S	-0.2214	3	3	110.5	R
0.219	S	-0.06	5	5	110.5	R
0.265	S	-0.014	9	9	112	R
0.279	S	0	13	13	113	R
0.314	S	0.035	16	16	114	R
0.271	S	-0.008	12	12	115	R
0.244	S	-0.035	7	7	116.5	R
0.322	S	0.043	18	18	116.5	R
0.285	S	0.007	14	14	118	R
0.324	S	0.045	19	19	119	R
0.25	S	-0.029	8	8	120	R
0.0563	S	-0.2247	2	2	121	R
0.318	S	0.039	17	17	122	R
0.424	S	0.145	24	24	123	R
0.387	S	0.088	22	22	124	R
0.228	S	-0.051	6	6	125	R
Sum =			7876	325		

Statistic	Value	Parameter
Count	25	m
SD	0.110	
Median	0.279	
Ref Stats		
Count	100	n
SD	0.073	
Critical Value	1951.9	

Parameter	Value
Number of Samples	25
LBGR	0.279
Avg	6.56
Pr	1
N	25.23
N/2	13
Actual N	25
SU σ	0.110
Z(1-alpha)	2.326
Z(1-beta)	1.645

Concentration (C)	above Background (C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.9	0.04	-2.2	0.07865	0.02207	196.625	5371.815	73.29267	19.5071	0.00	1.00
1	0.14	-1.3	0.17899	0.07430	447.463	13383.97	116.8027	10.1978	0.00	1.00
1.1	0.24	-0.4	0.38865	0.22917	971.623	24617.12	156.8984	4.17297	0.00	1.00
1.2	0.34	0.5	0.63818	0.48259	1595.41	23744.63	154.0929	0.20084	0.42	0.58
1.25	0.39	1.0	0.78025	0.63370	1900.63	17590.17	132.6279	-2.068	0.98	0.02
1.3	0.44	1.5	0.85568	0.76581	2138.95	10701.88	103.4499	-4.955	1.00	0.00
1.35	0.49	1.9	0.91045	0.84861	2276.11	6280.02	79.12029	-8.2123	1.00	0.00
1.4	0.54	2.4	0.9516	0.92078	2387.89	2706.103	52.02021	-14.839	1.00	0.00
1.5	0.64	3.3	0.99119	0.98164	2475.47	382.1346	19.54826	-43.437	1.00	0.00
1.6	0.74	4.2	0.99766	0.99550	2494.15	57.98401	7.61341	-113.98	1.00	0.00
1.7	0.84	5.1	0.99980	0.99960	2499.49	2.649599	1.627759	-536.4	1.00	0.00
1.8	0.94	6.0	0.99999	0.99998	2499.97	0.027462	0.165718	-5271.7	1.00	0.00



QUANTILE TEST

From NUREG 1505, Table A.7b Values of r and k for the Quantile Test When α is Approximately 0.025

25	n (number of survey unit measurements)
100	m (number of reference area measurements)
Use:	
m =	100
n =	25
r =	4
k =	3
alpha	0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

# of R:	100	n
# of S:	25	m
Avg Rank R:	73.5	
Avg Rank S:	13	

For m or n greater than 20, the critical value (k) can be calculated from

$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

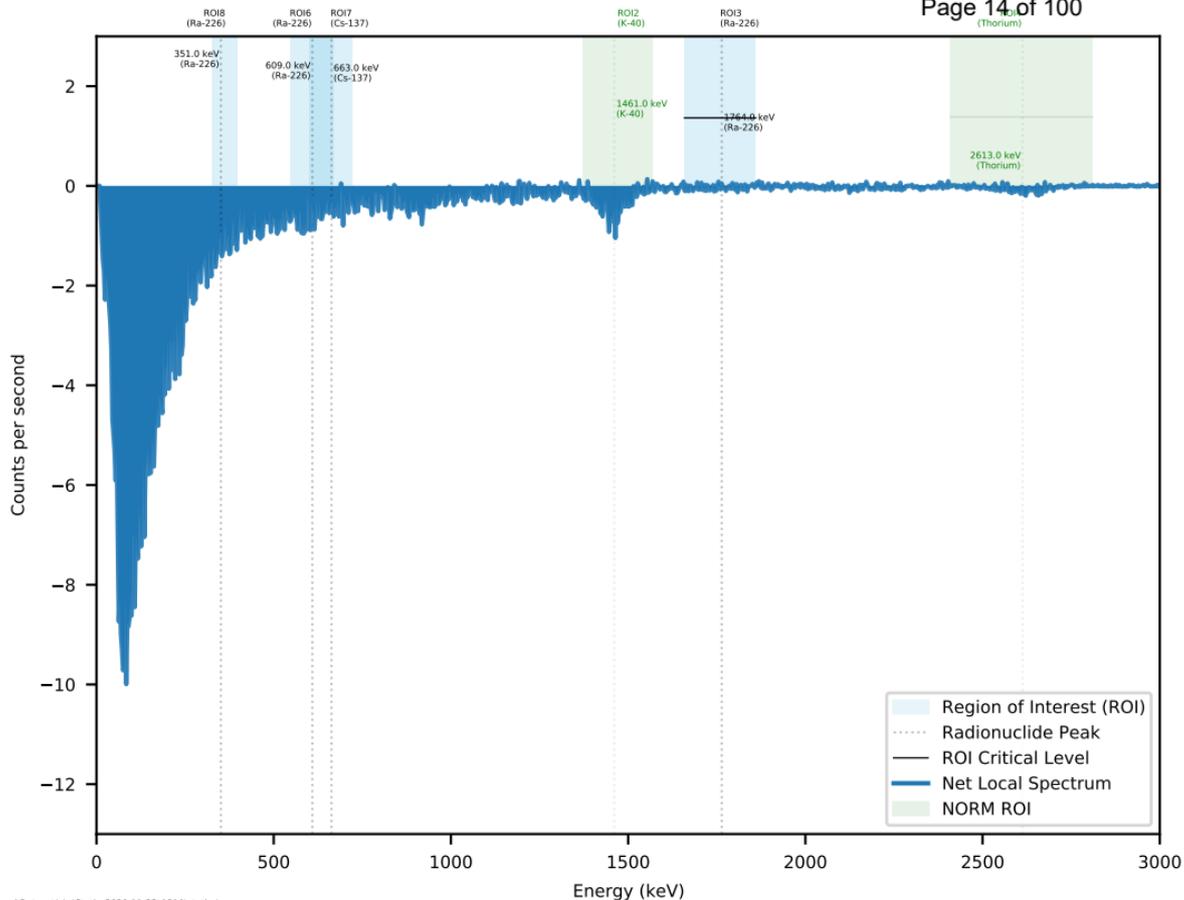
$z = 99.0\%$ percentile of standard normal distribution = 2

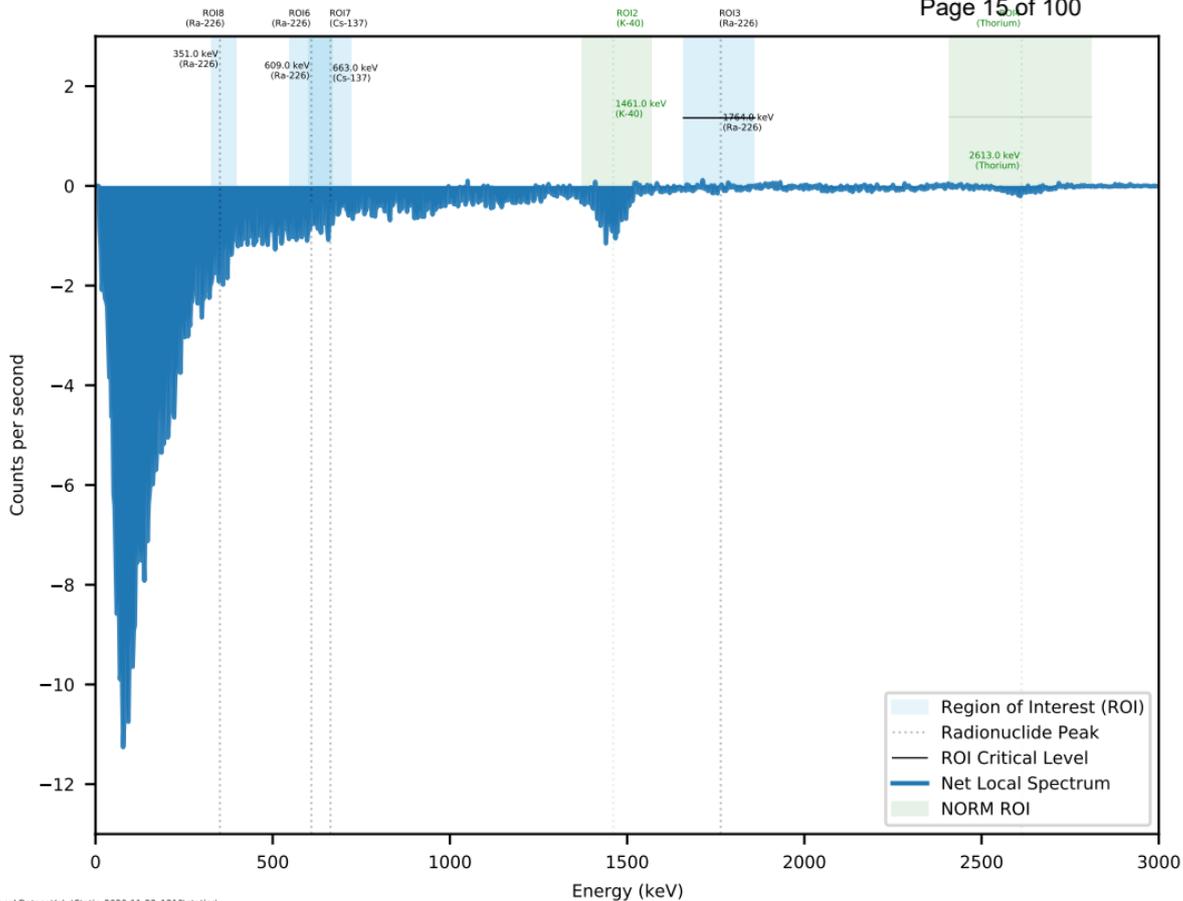
$$k = 1951.9$$

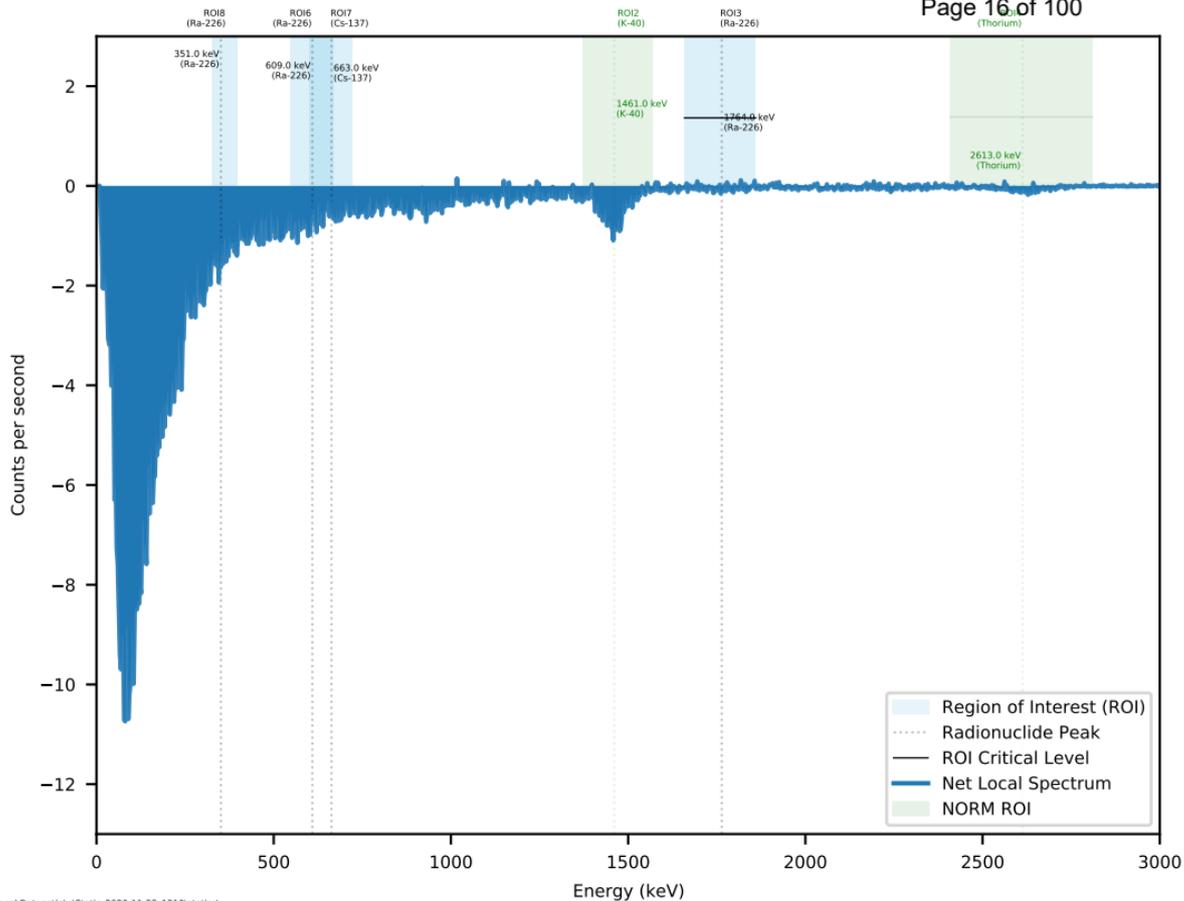
$$\alpha = \alpha/2 = 0.01$$

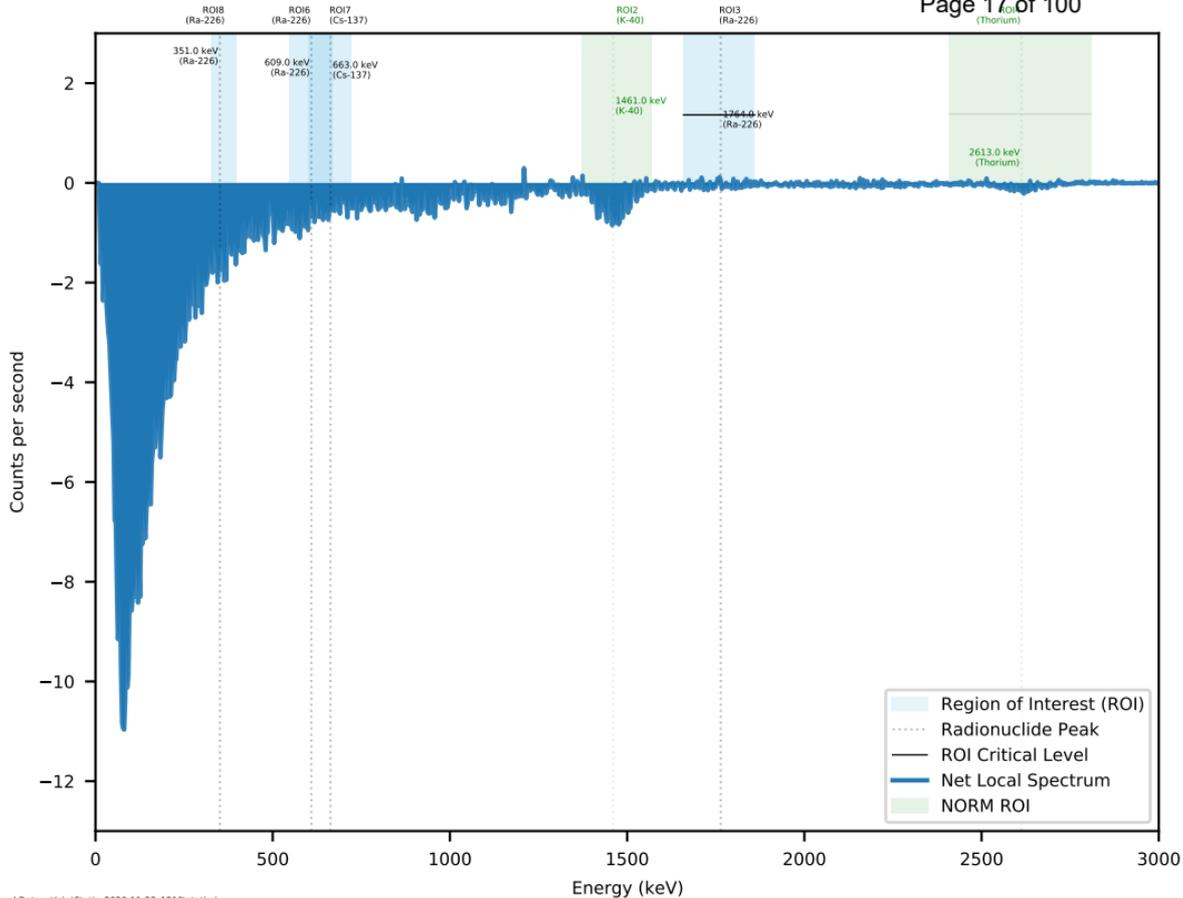
$$\beta = 0.05$$

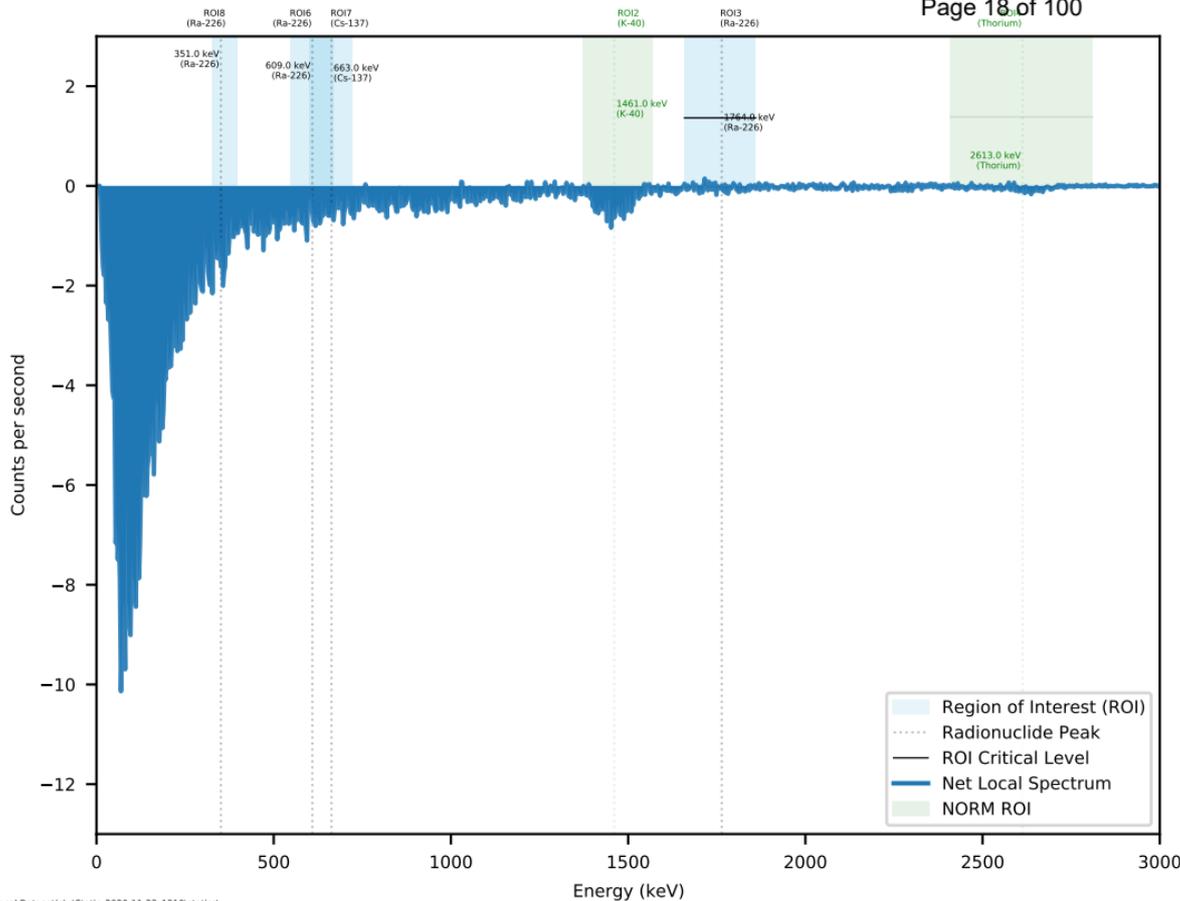
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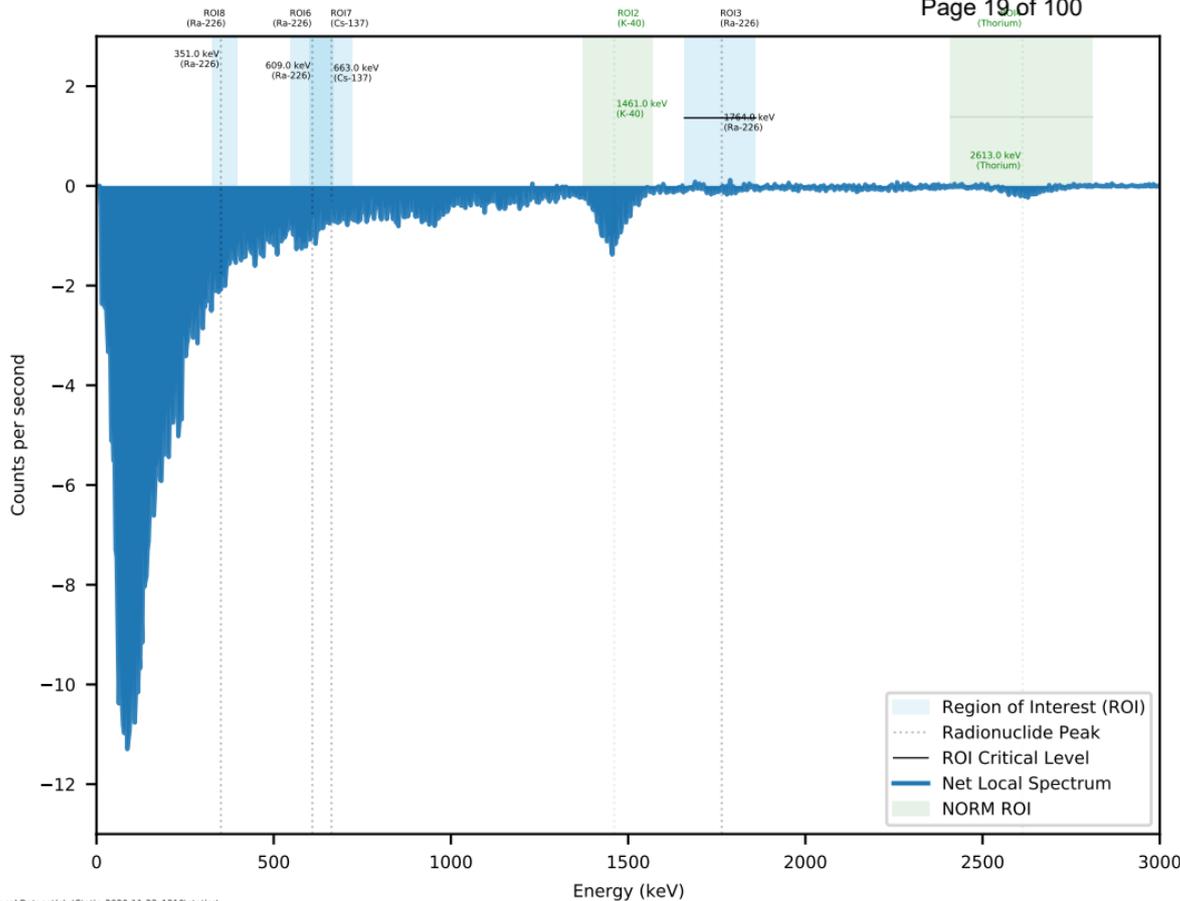


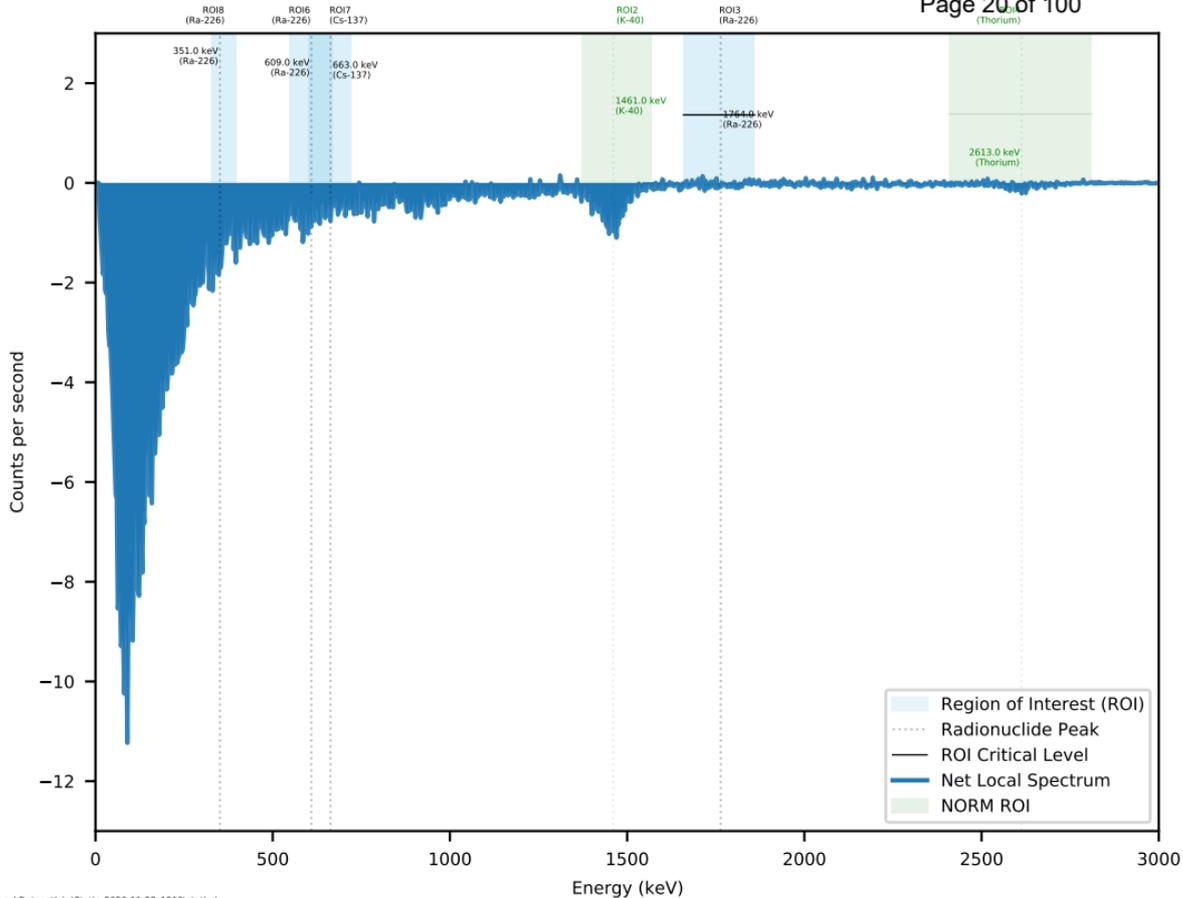


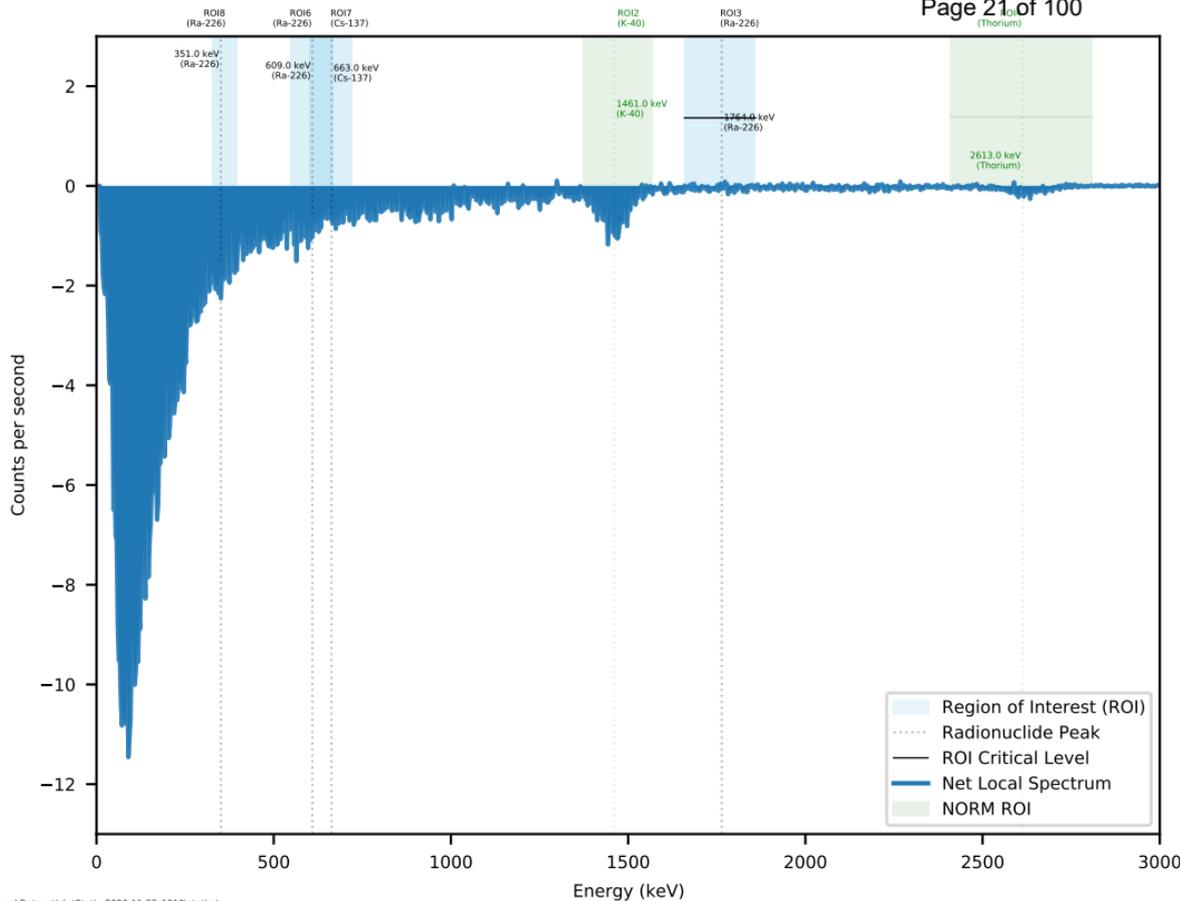


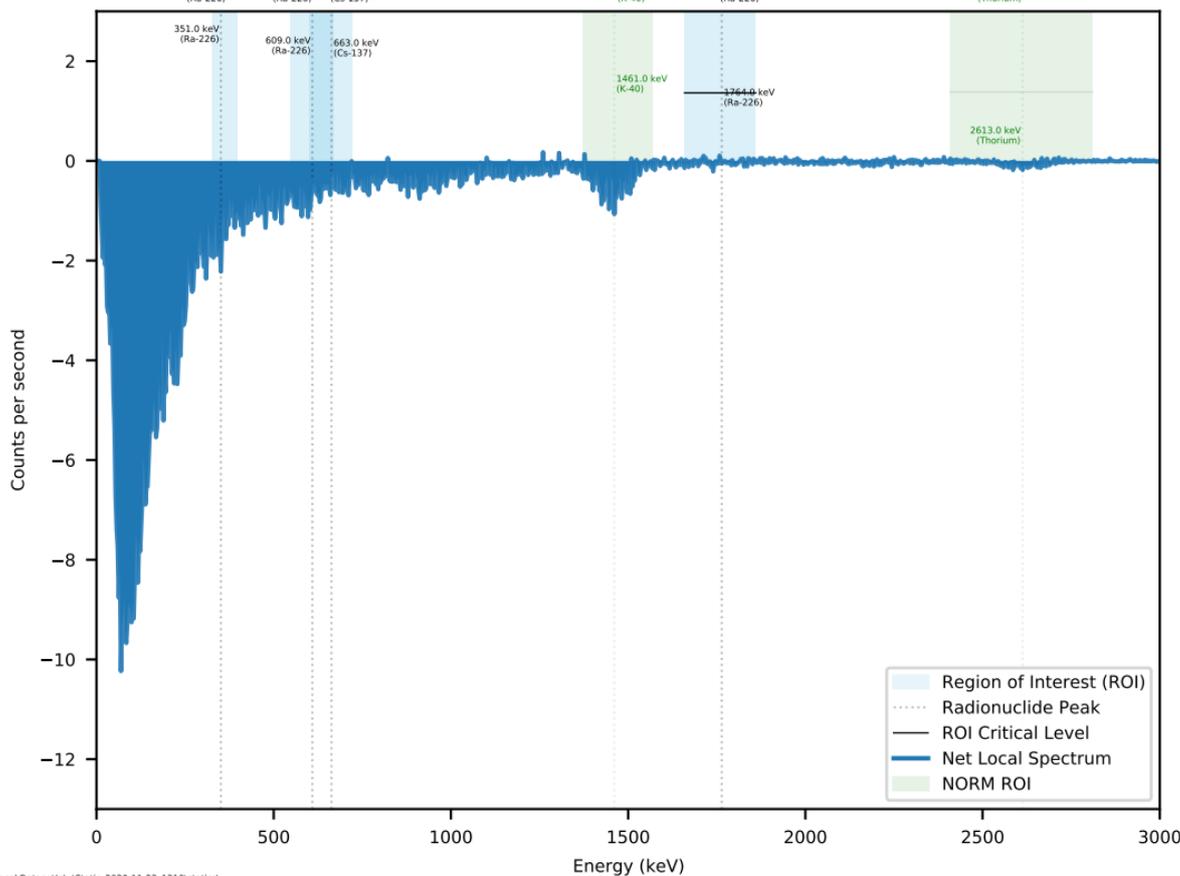


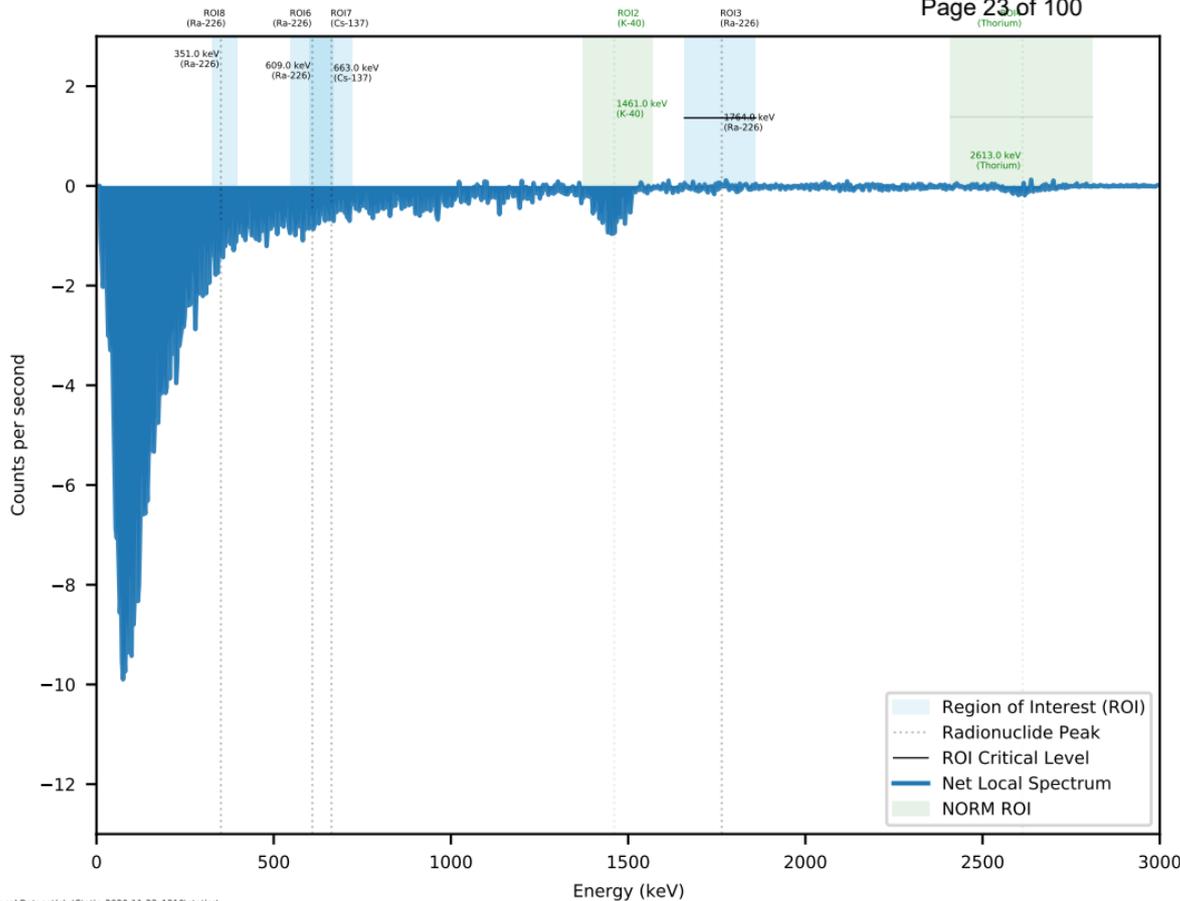


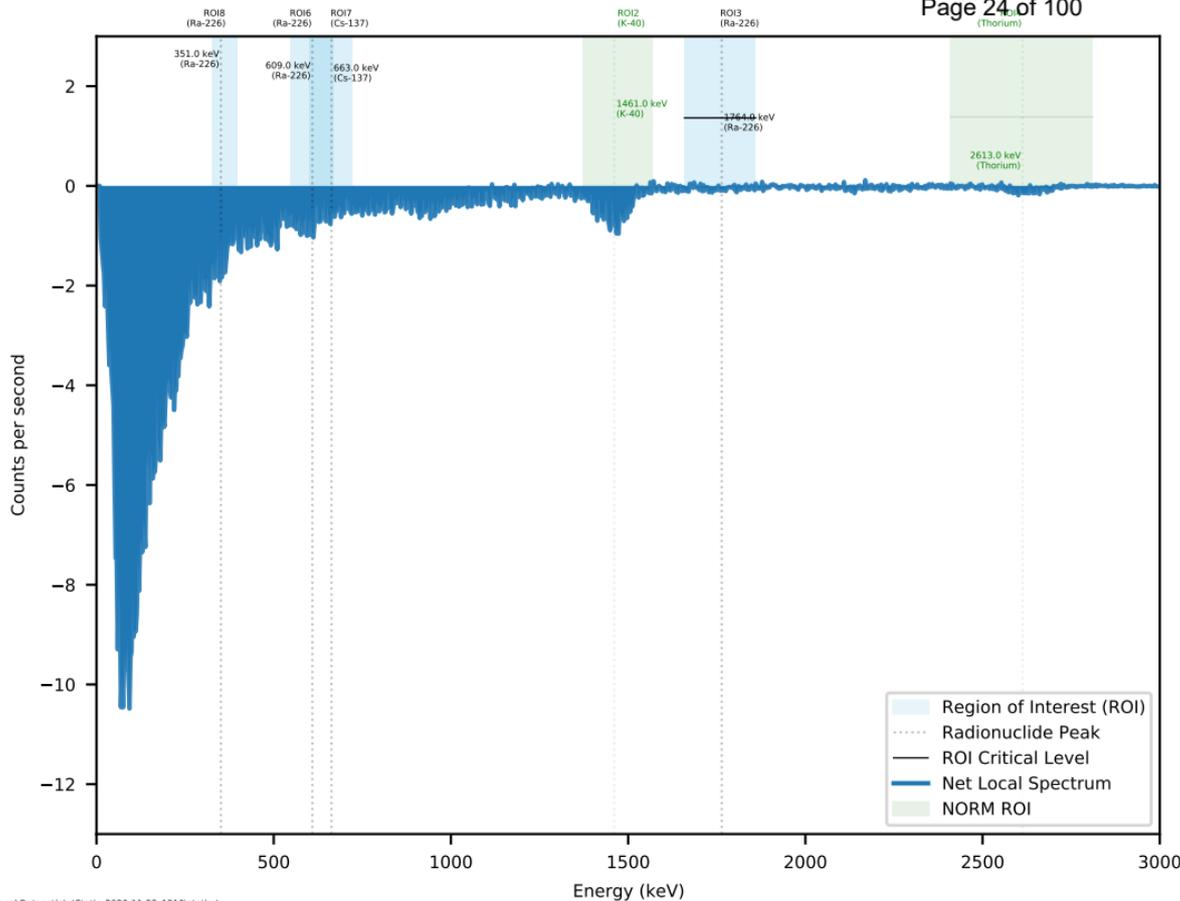


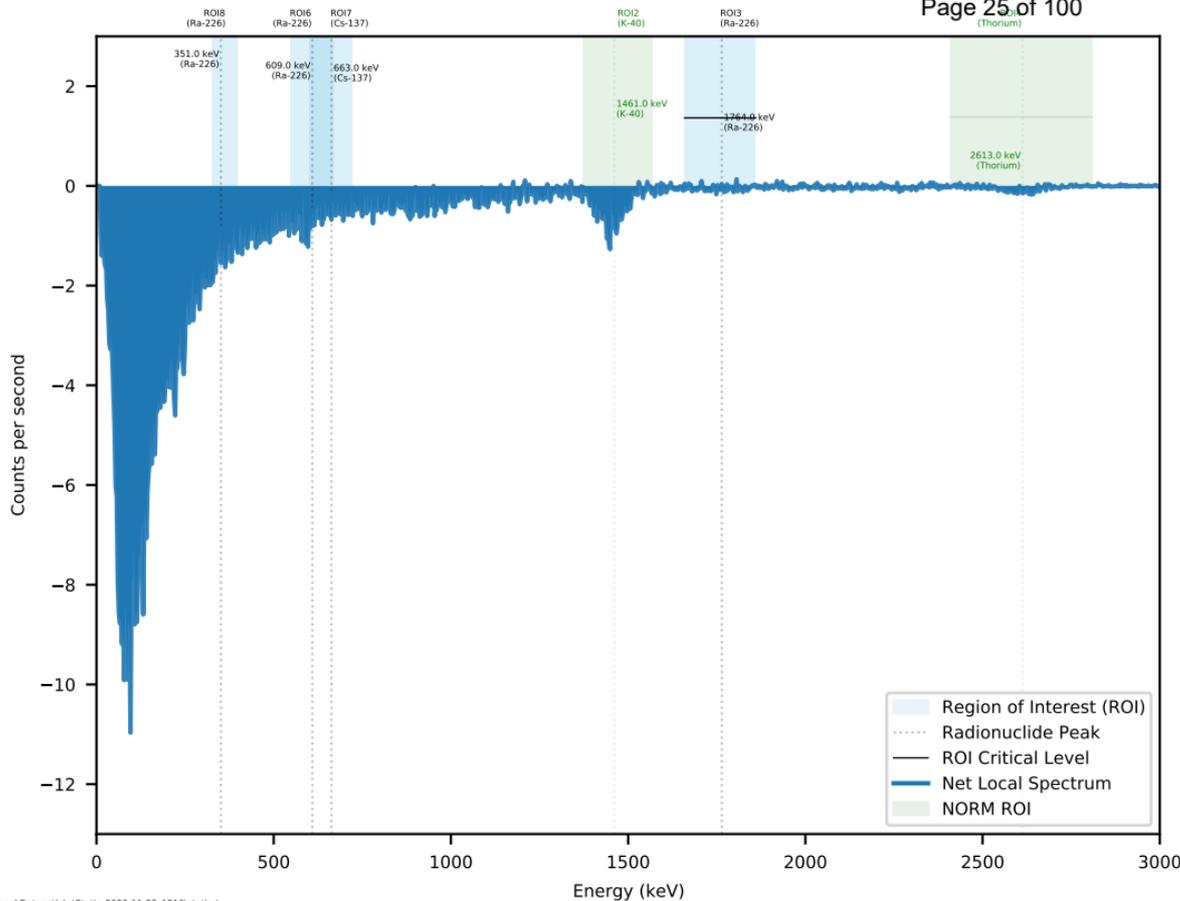


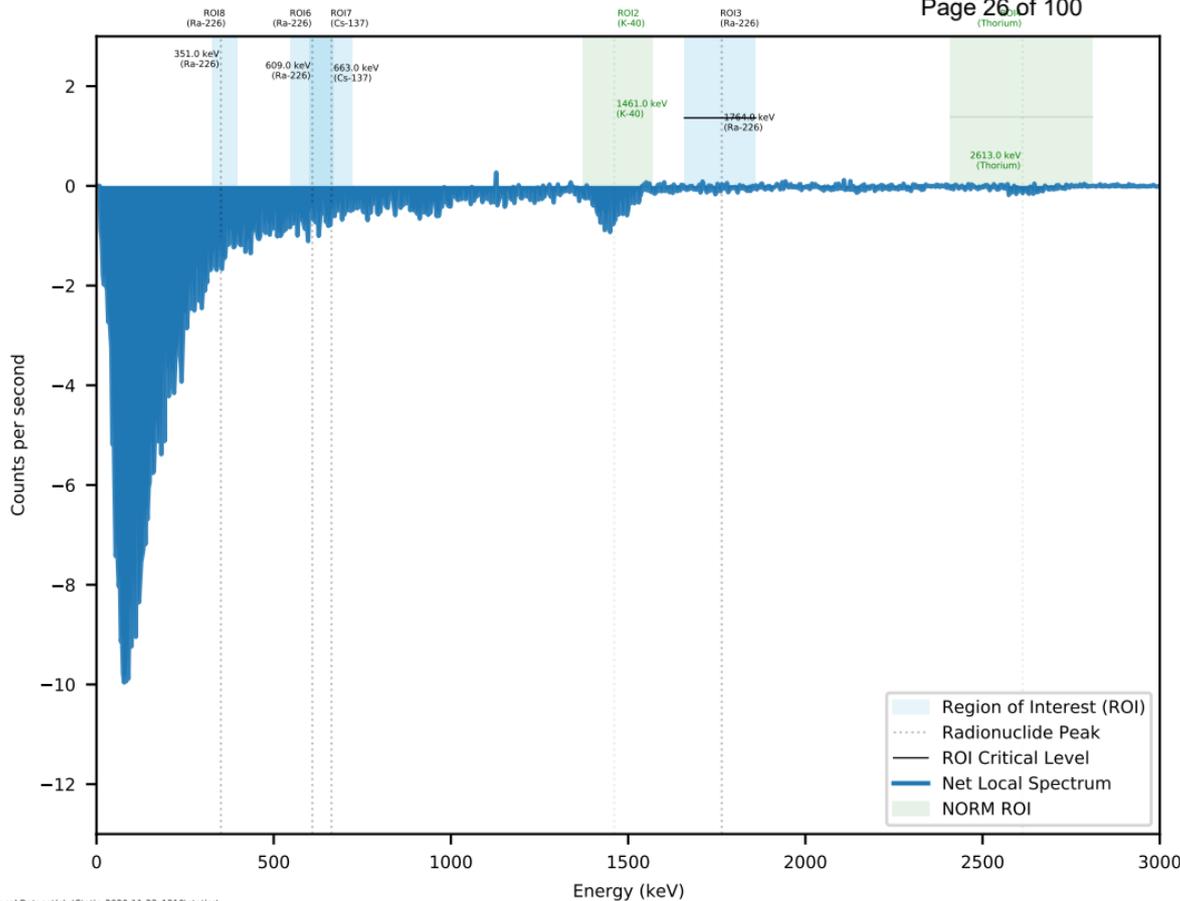


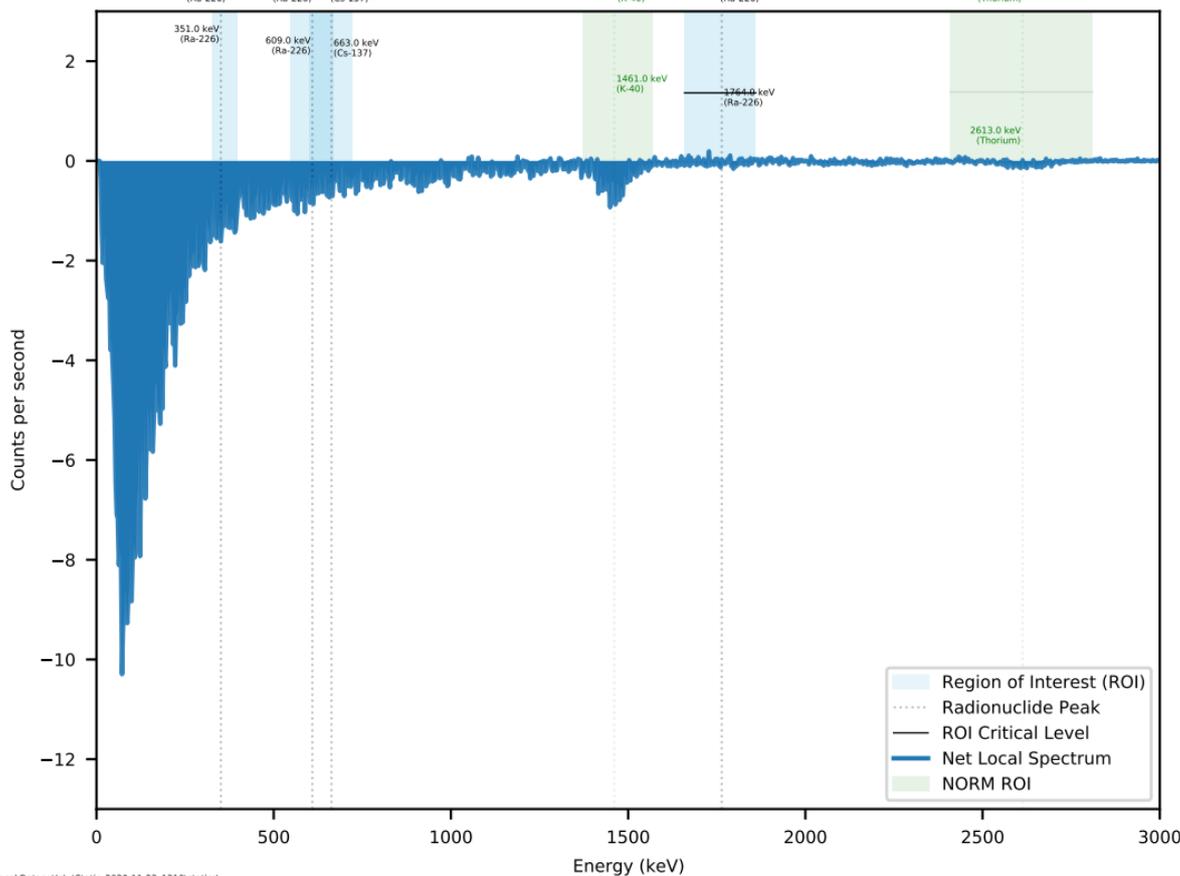


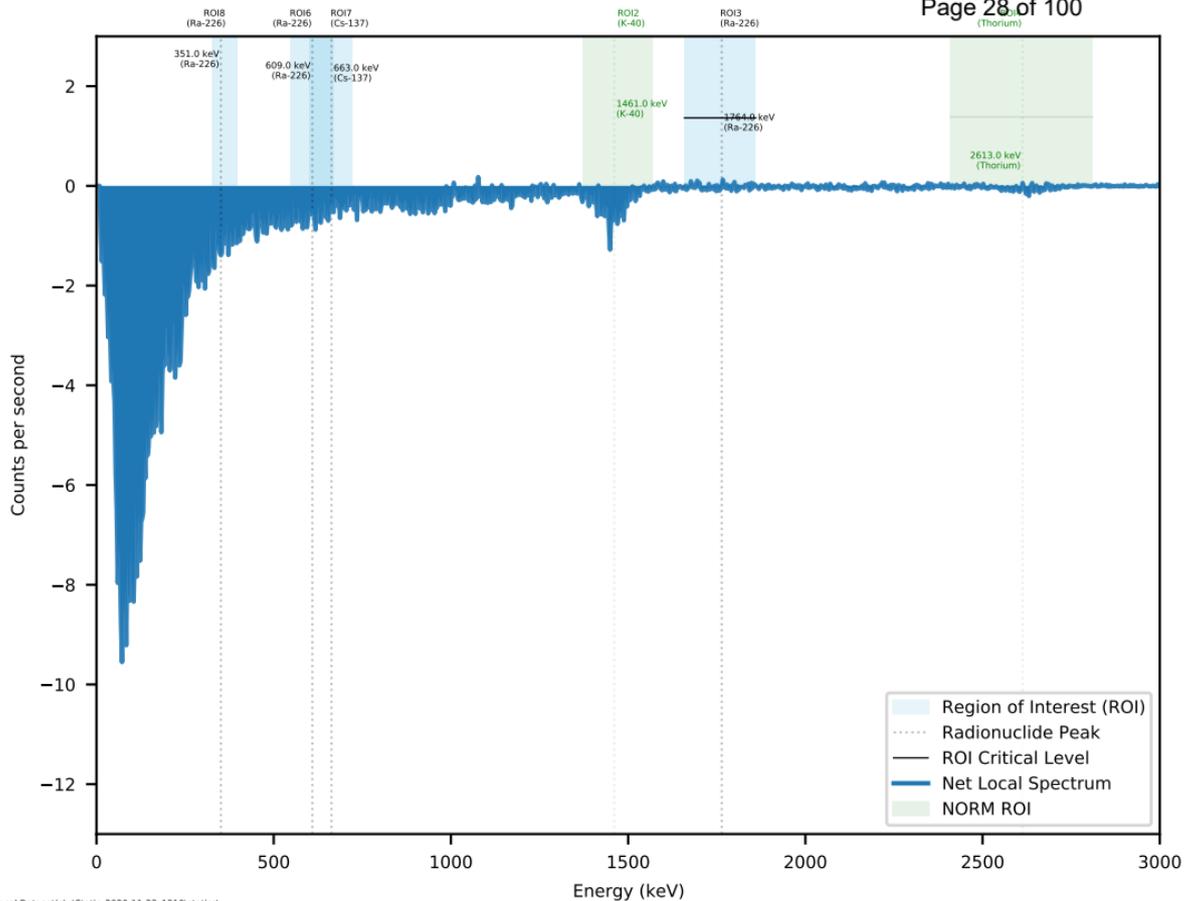


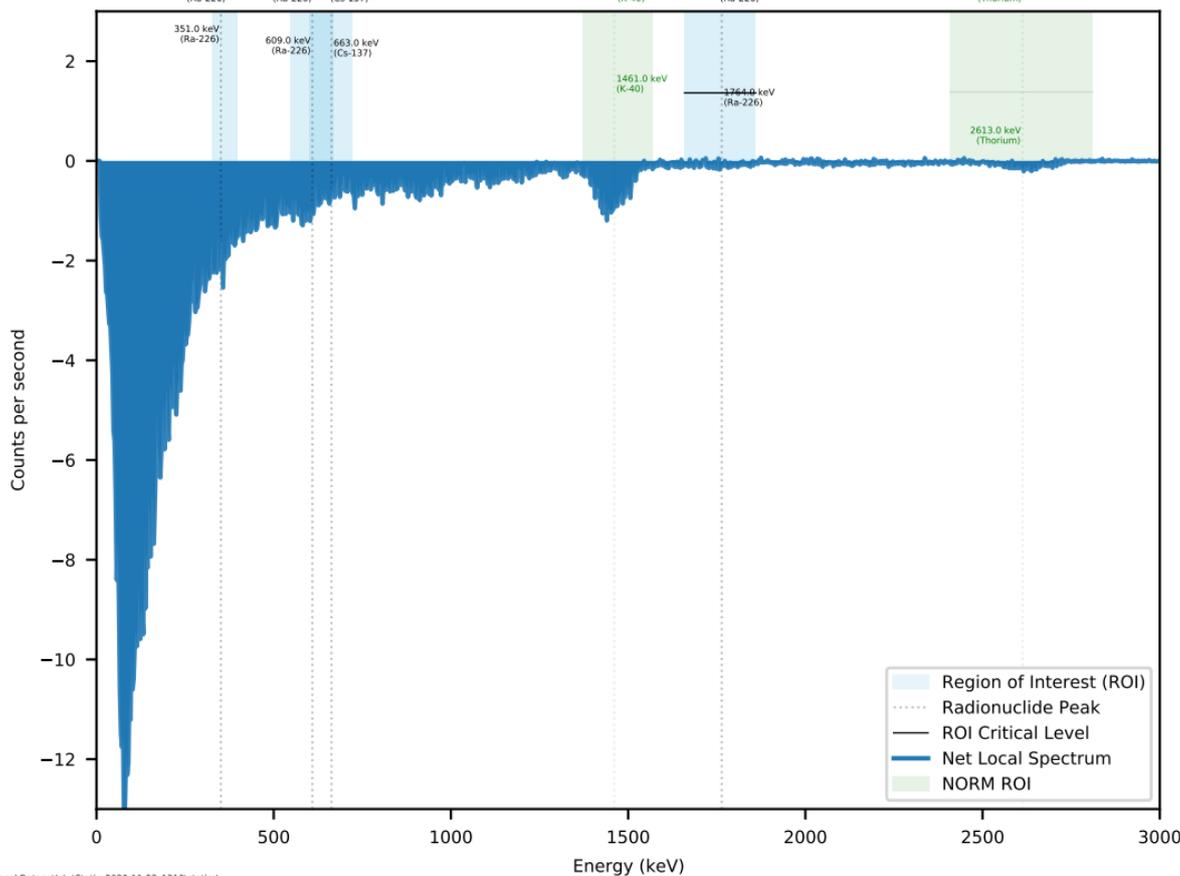


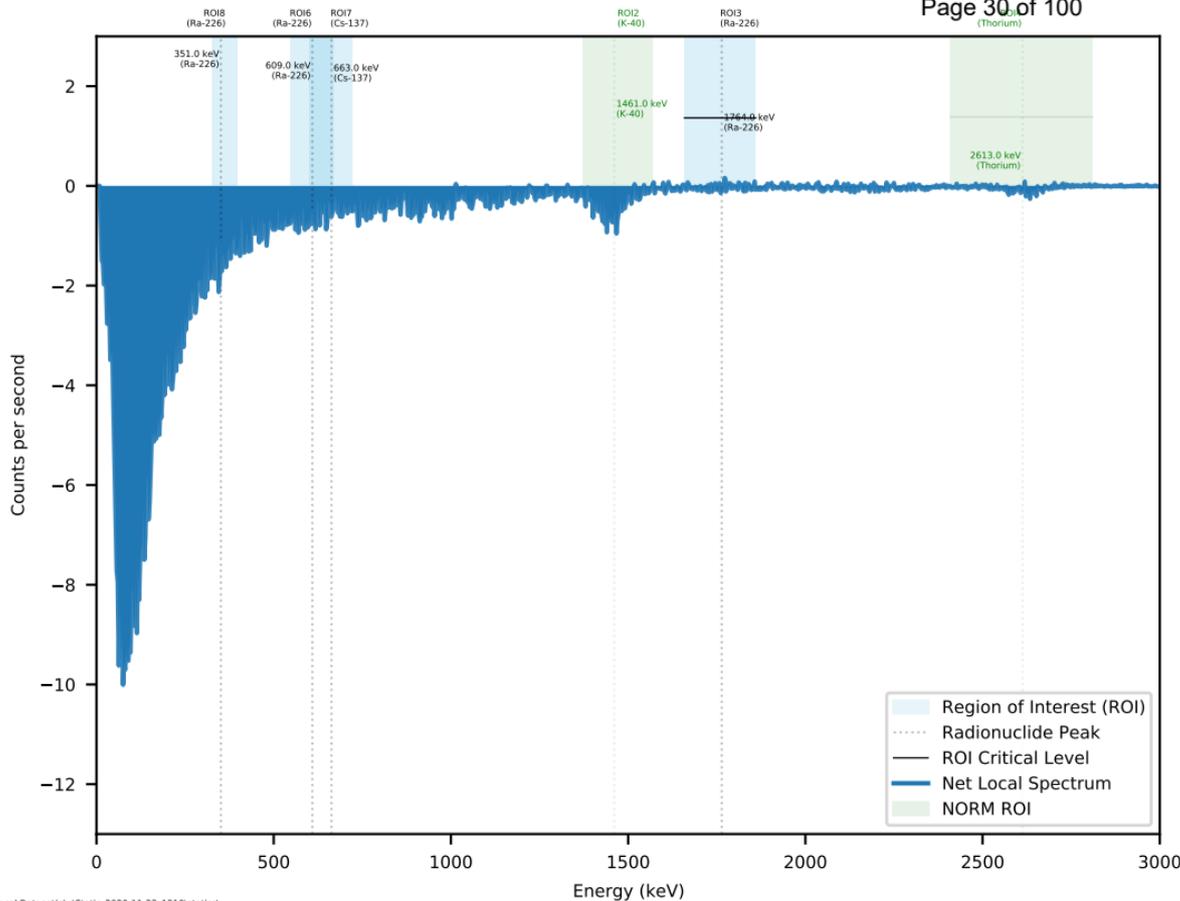


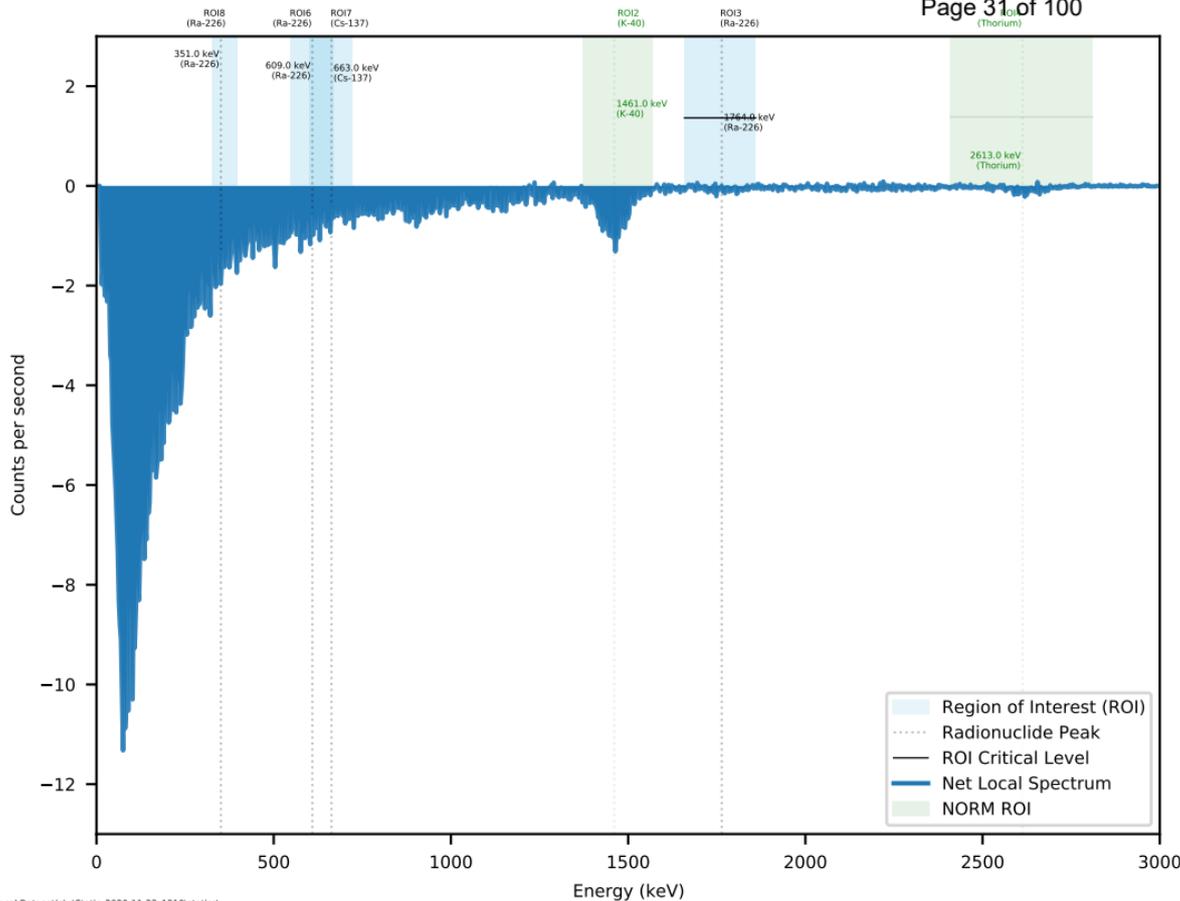


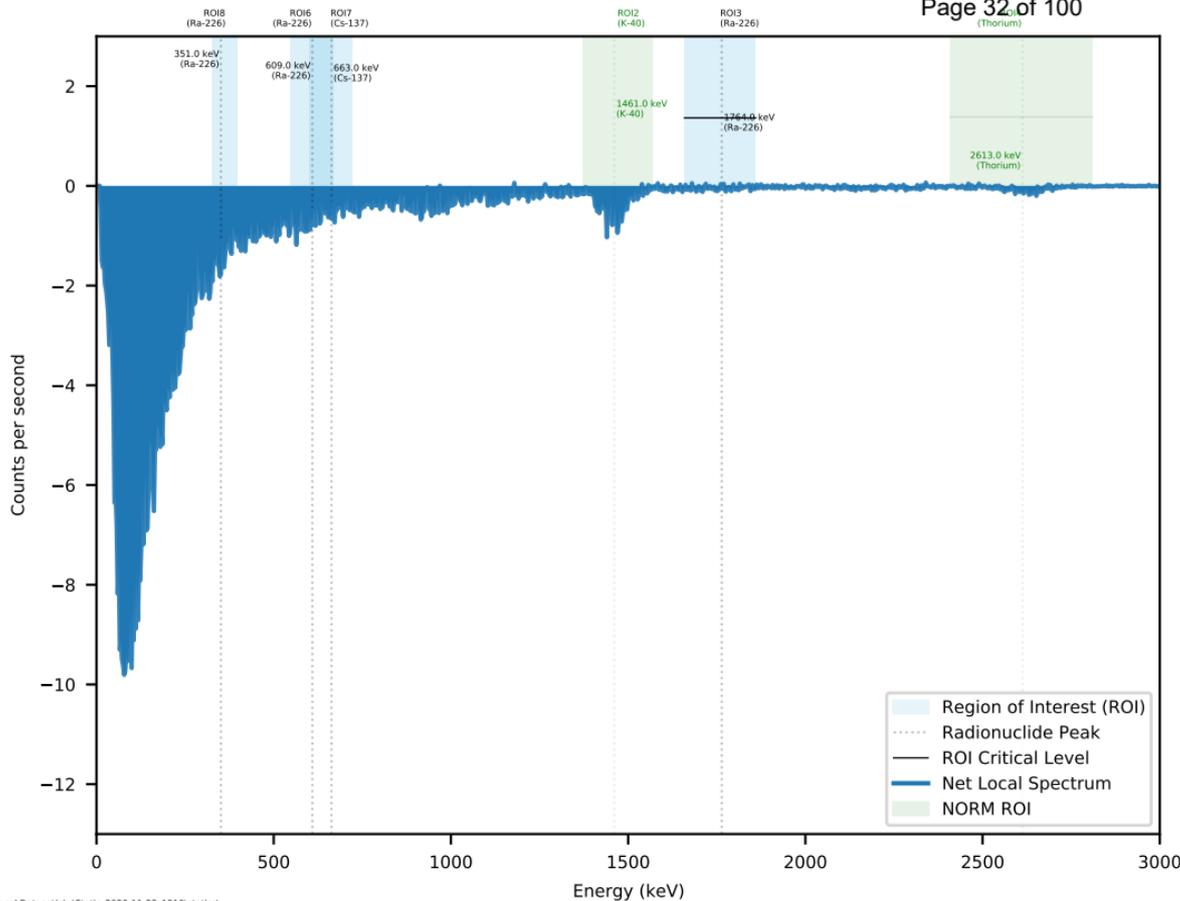


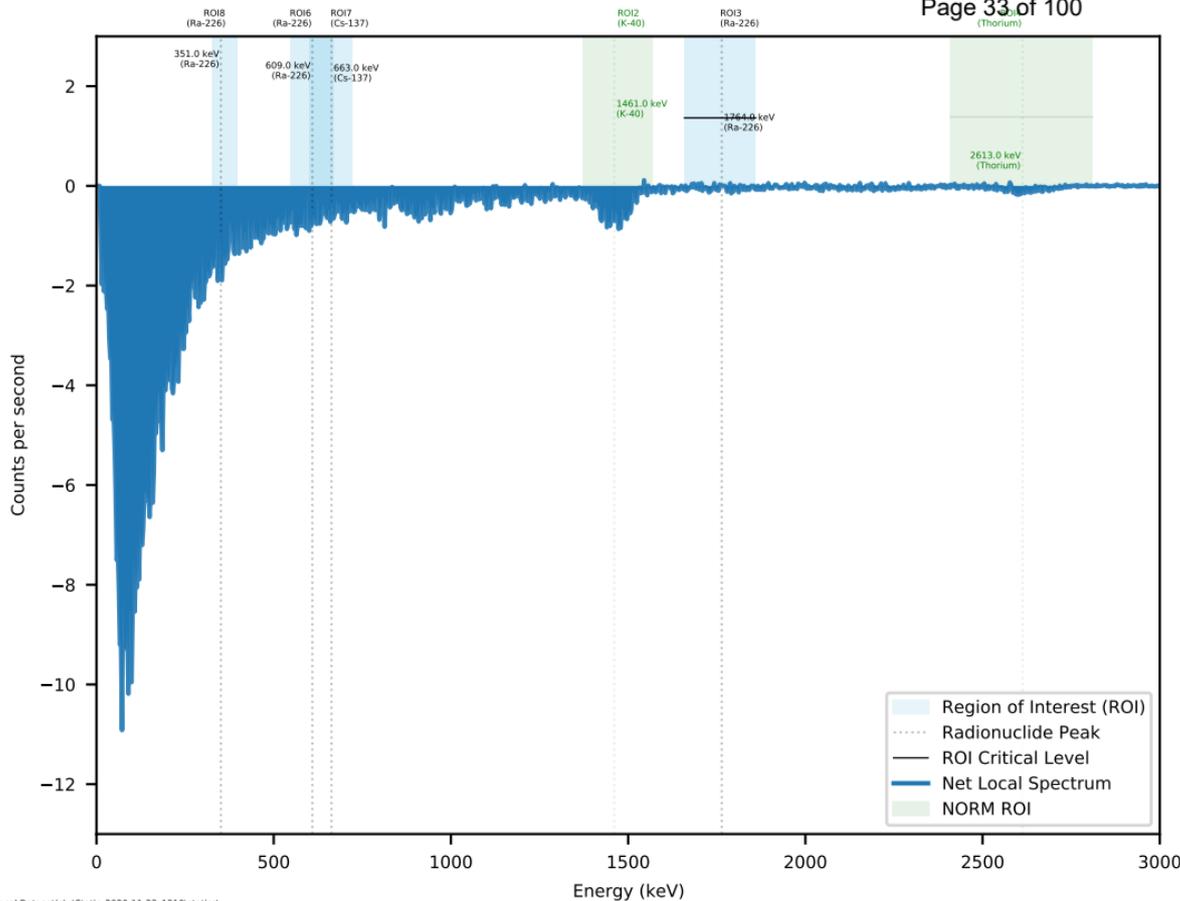


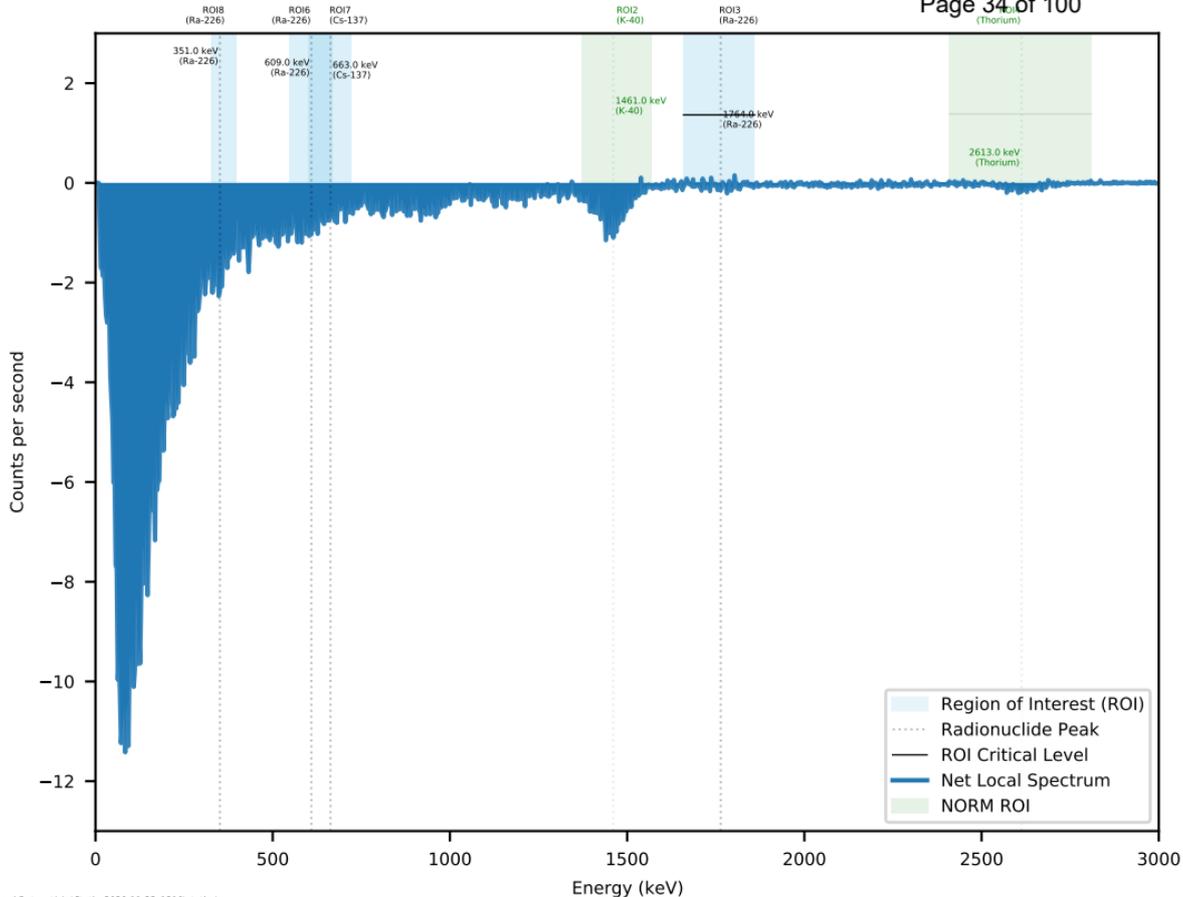


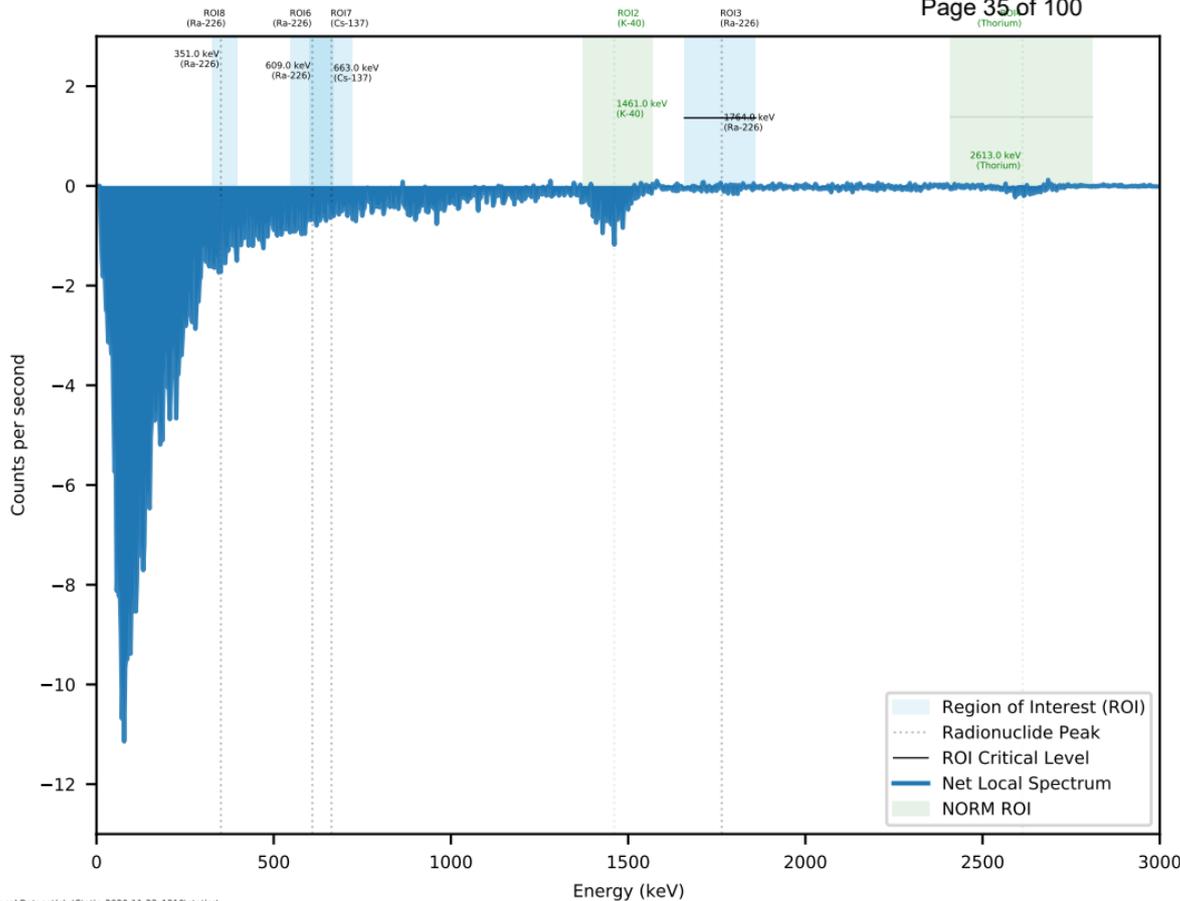


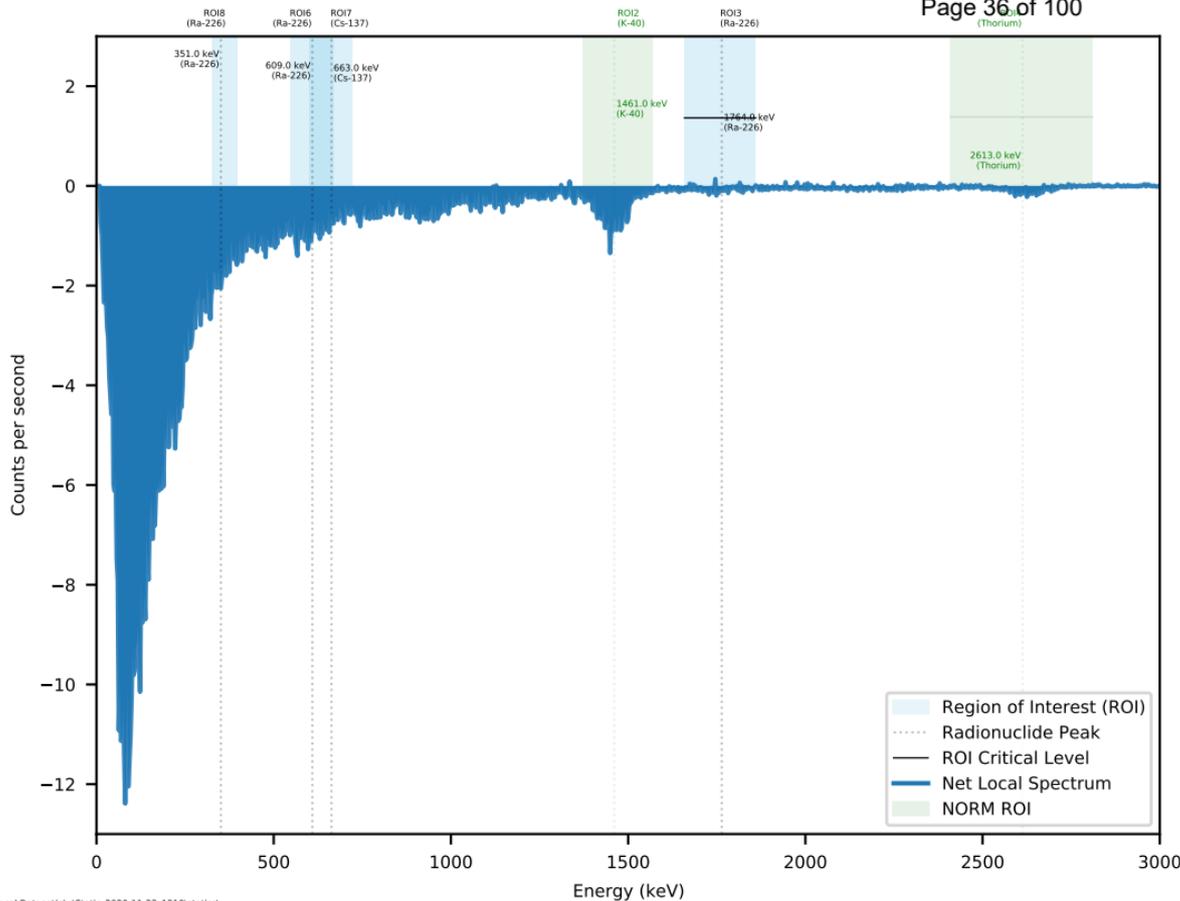


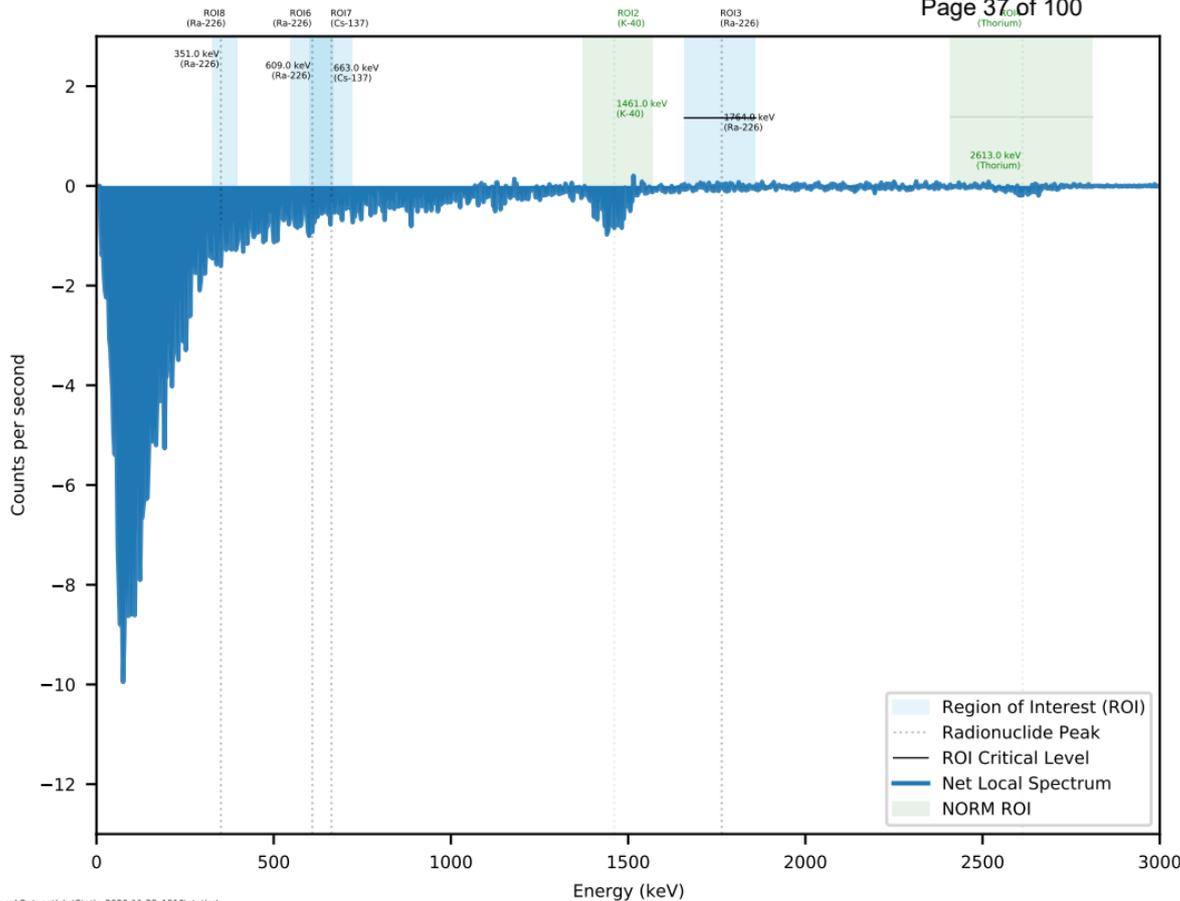


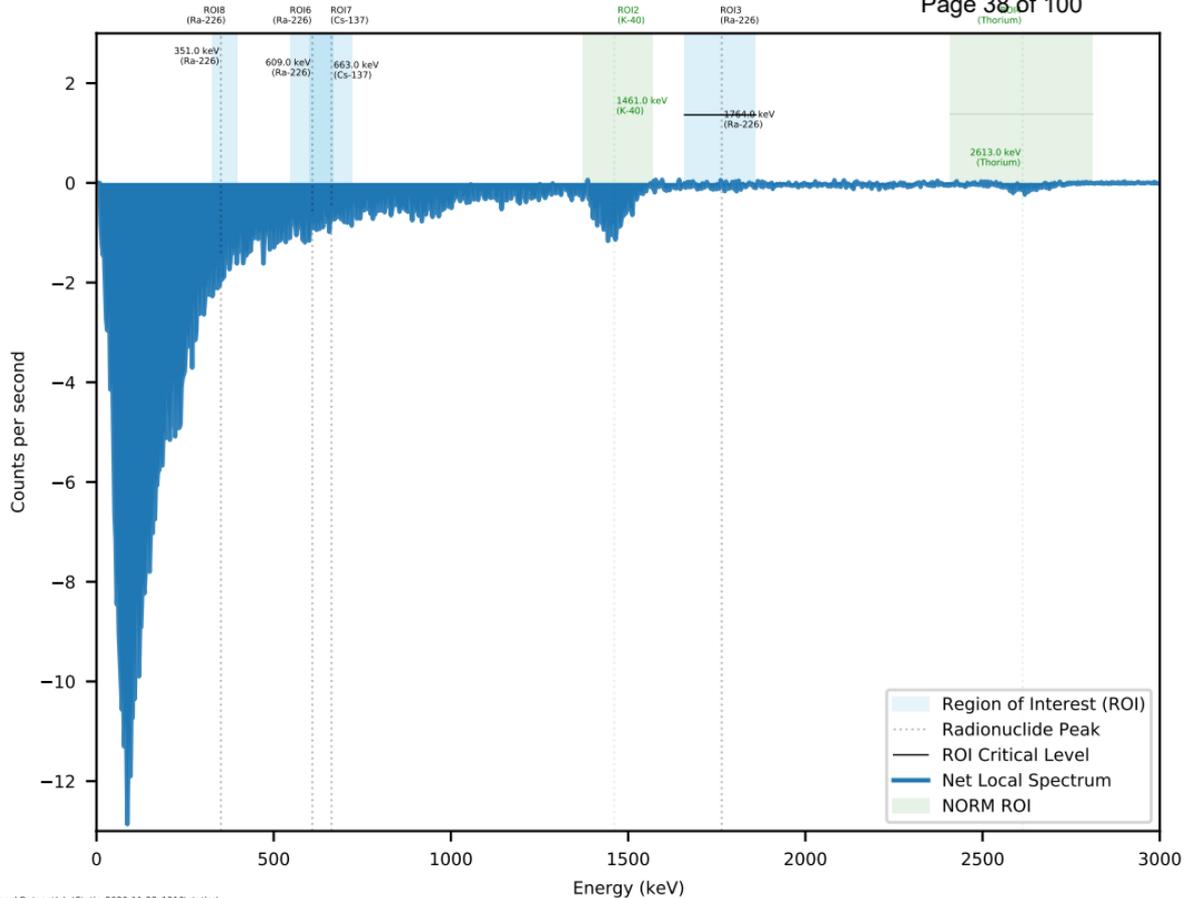


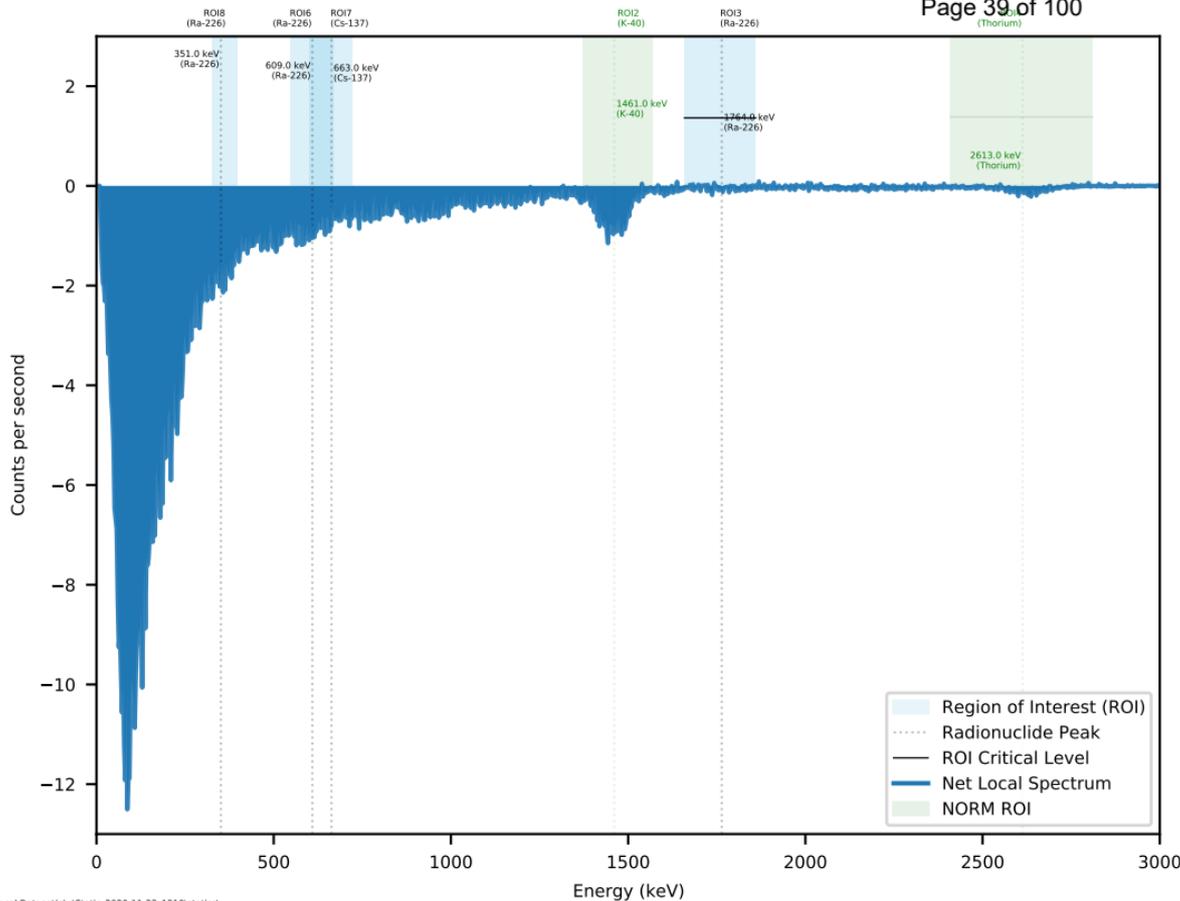


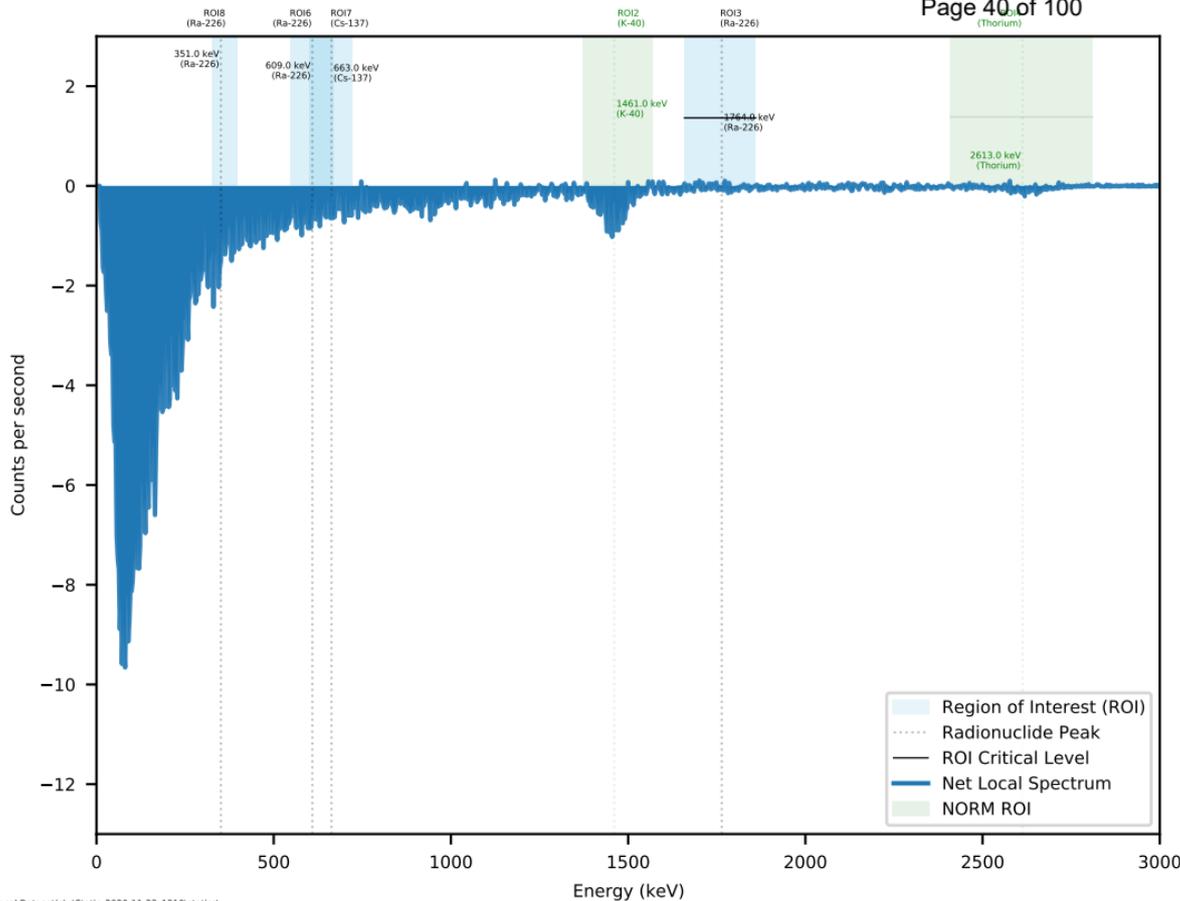


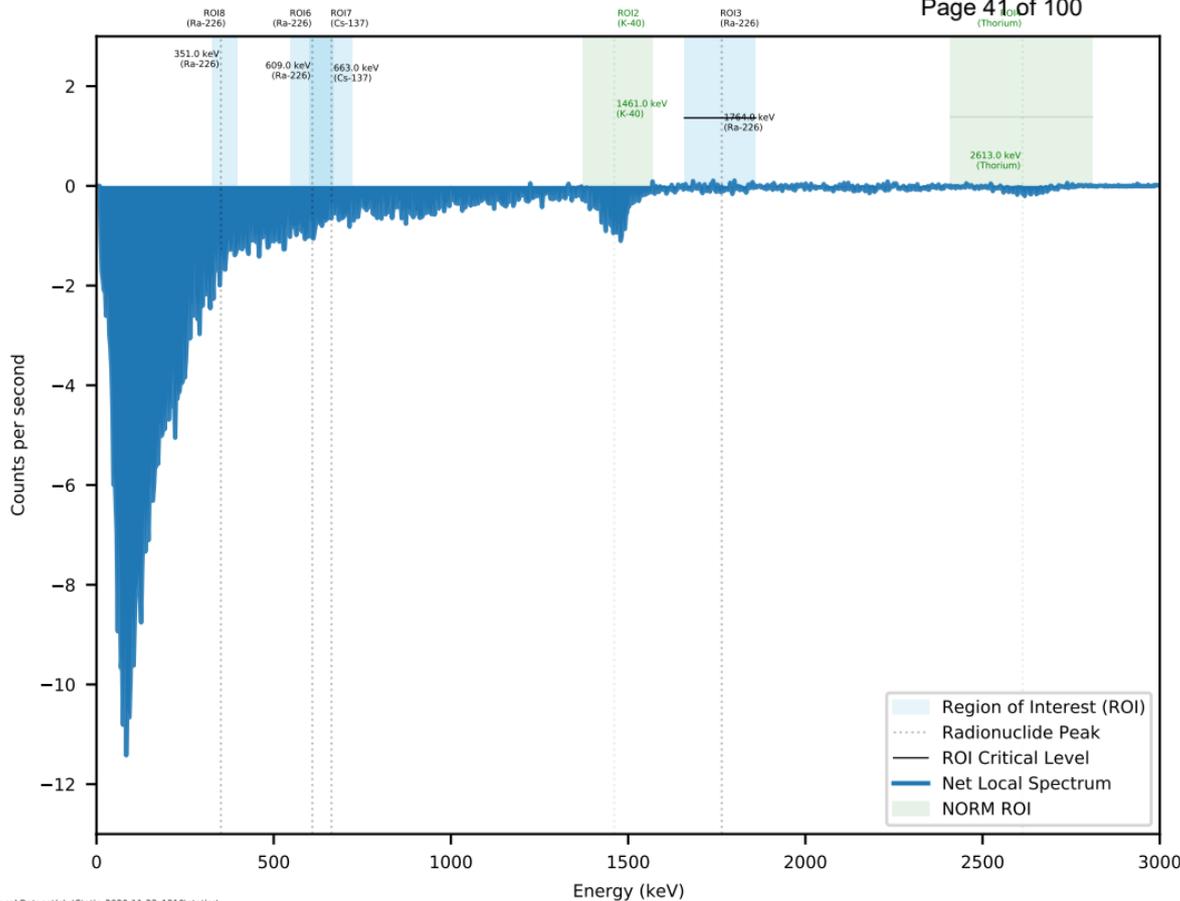


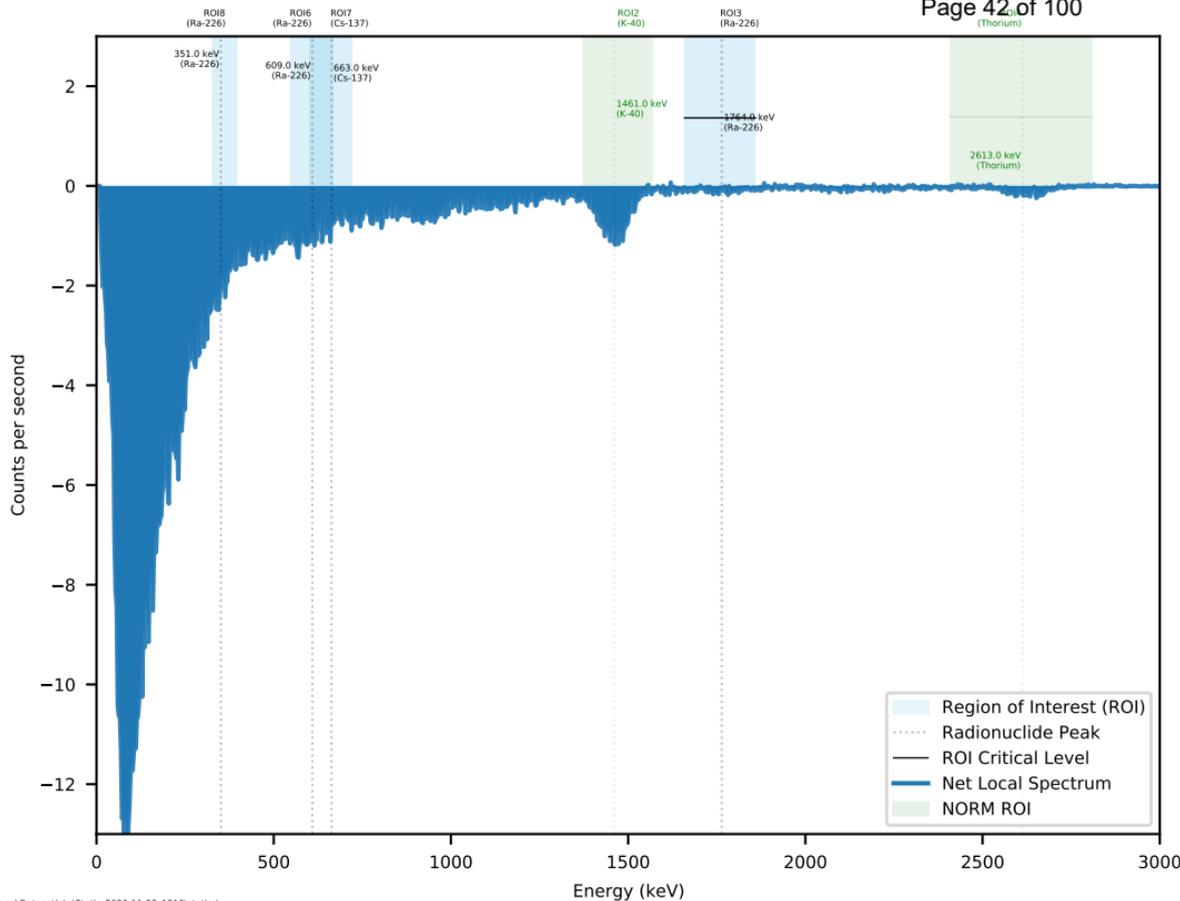


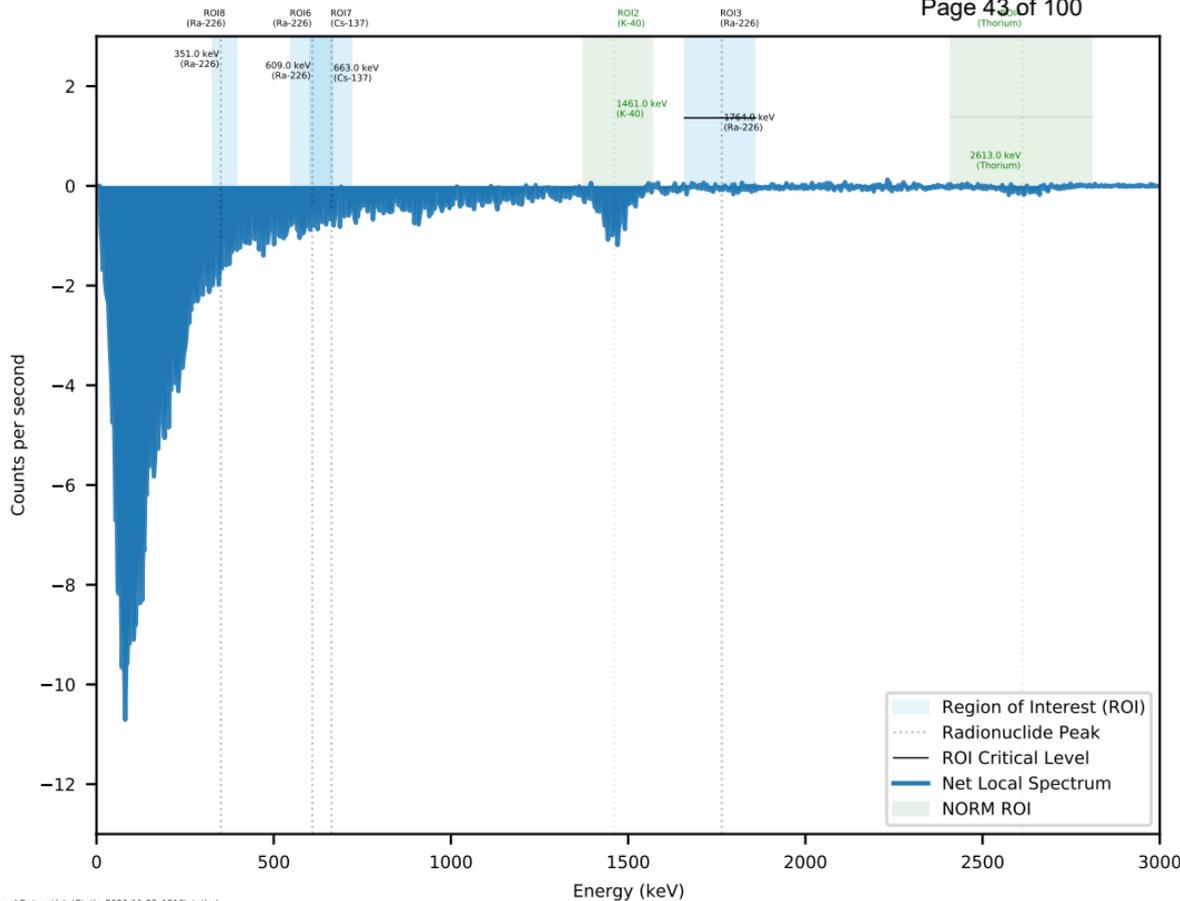


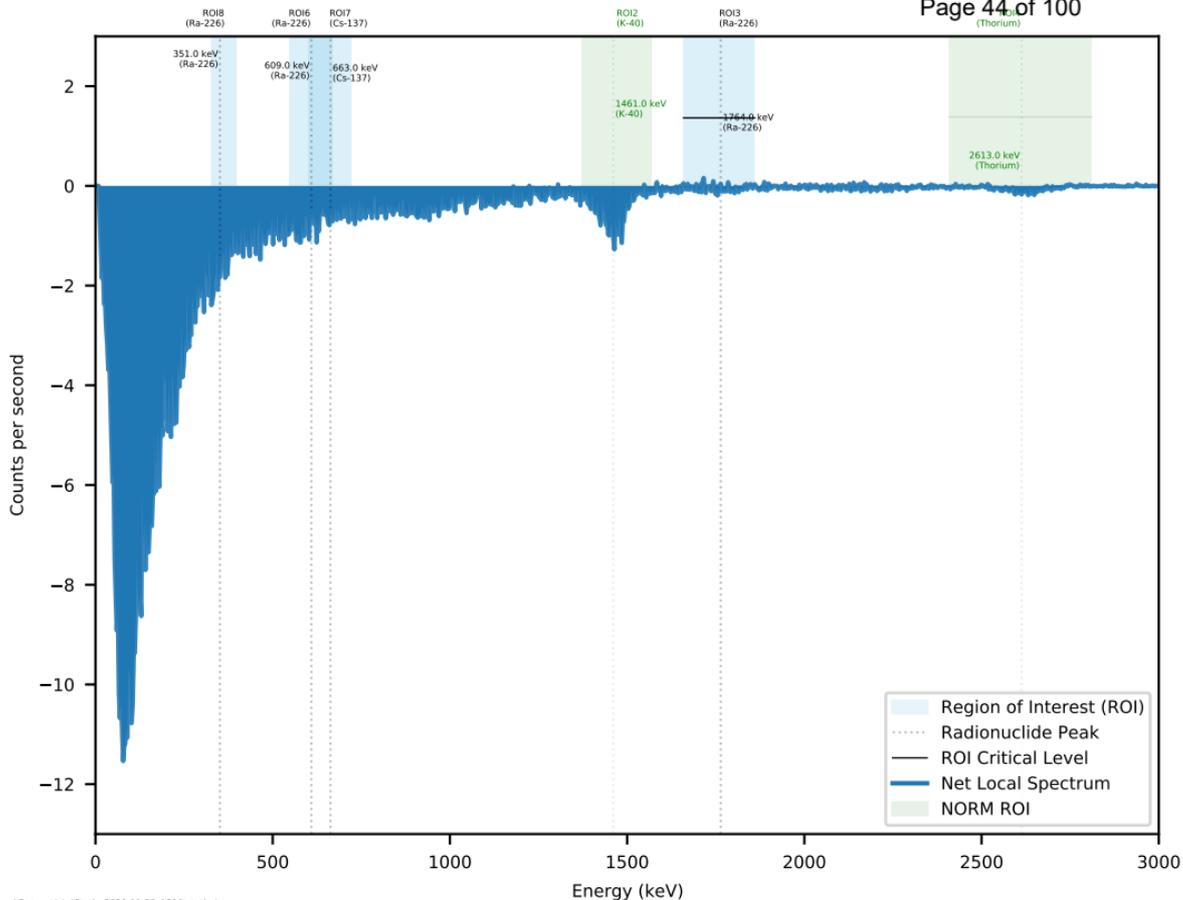


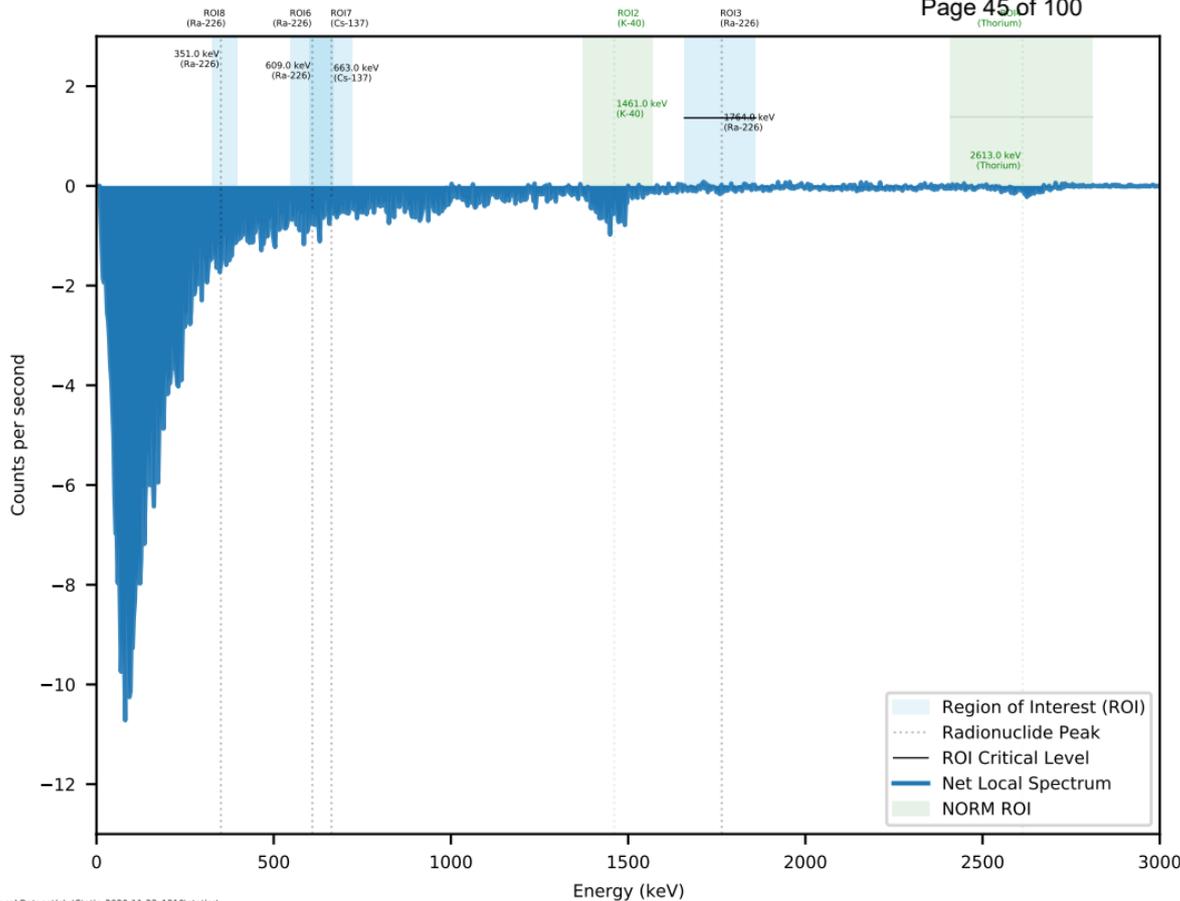


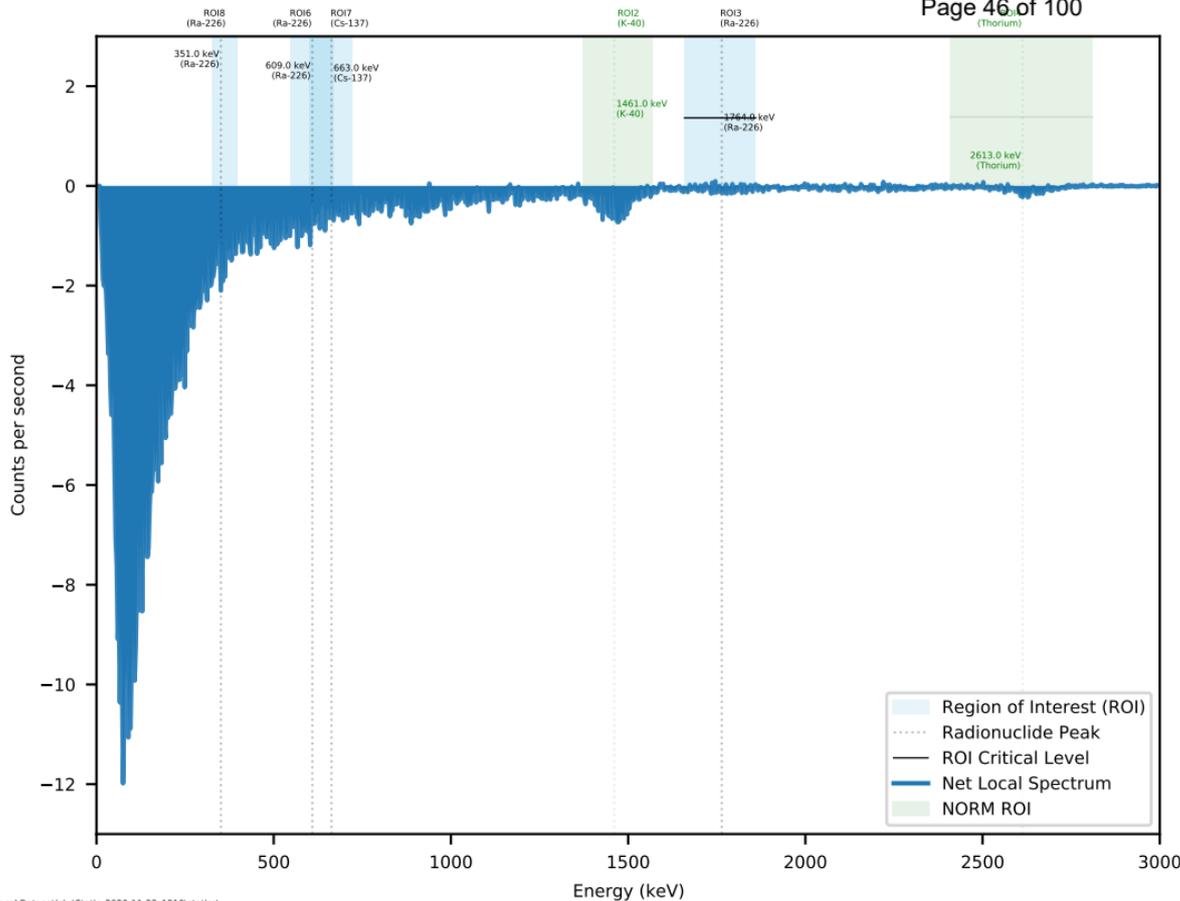


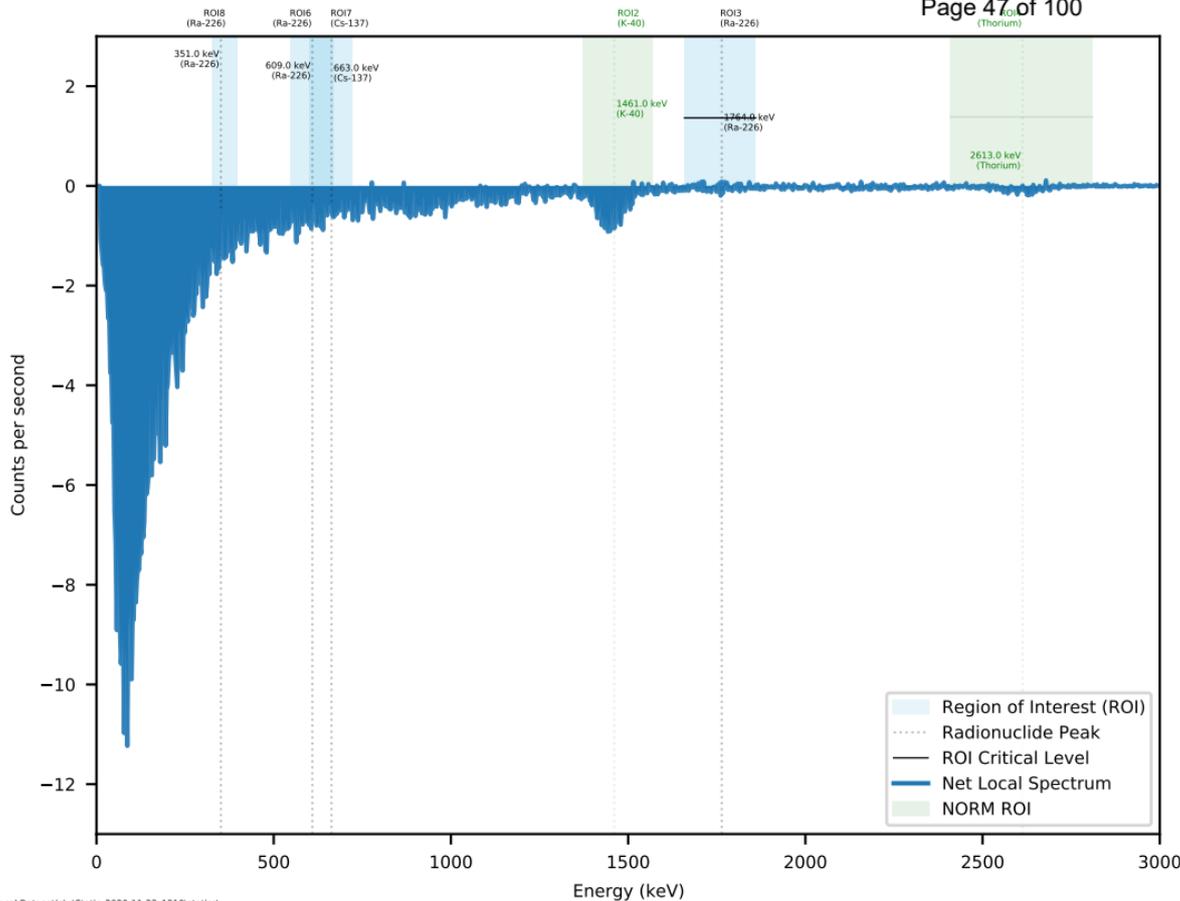


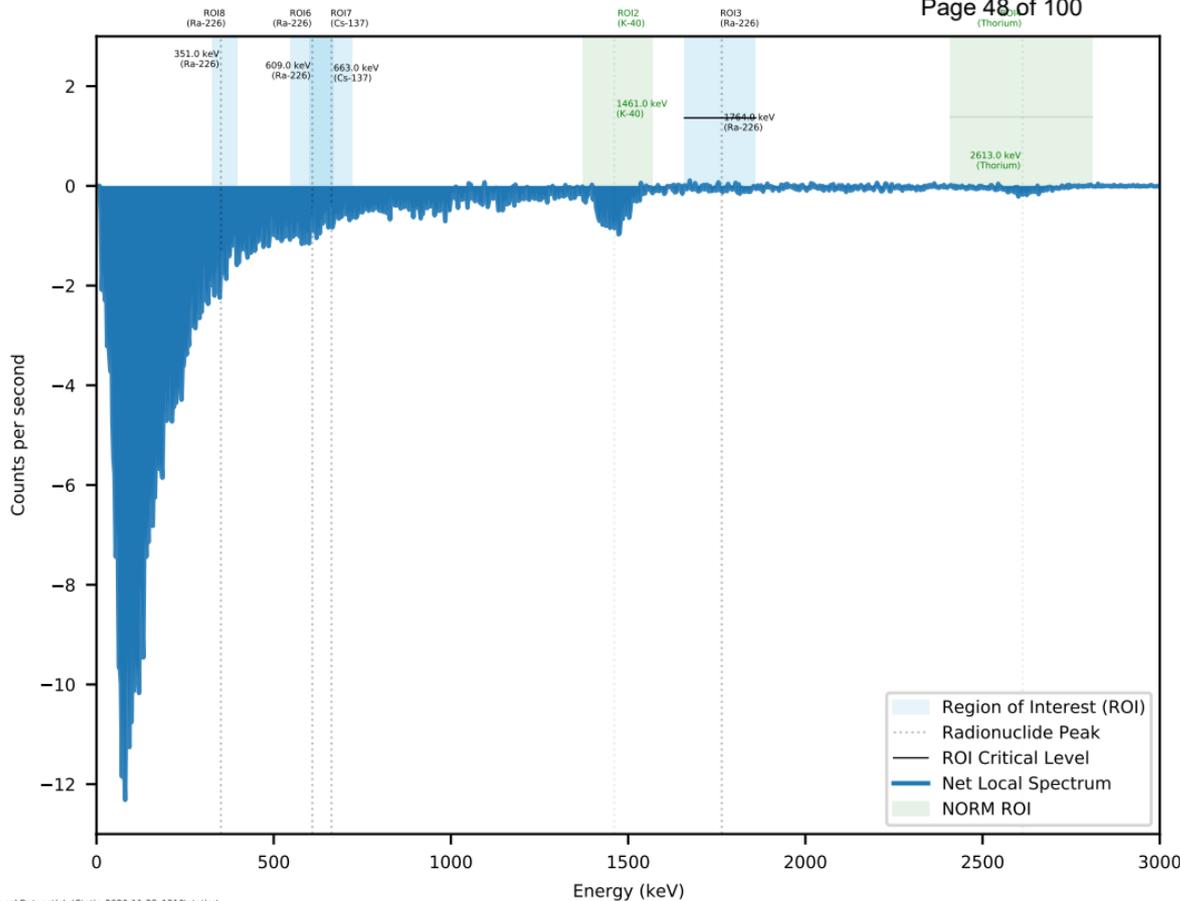


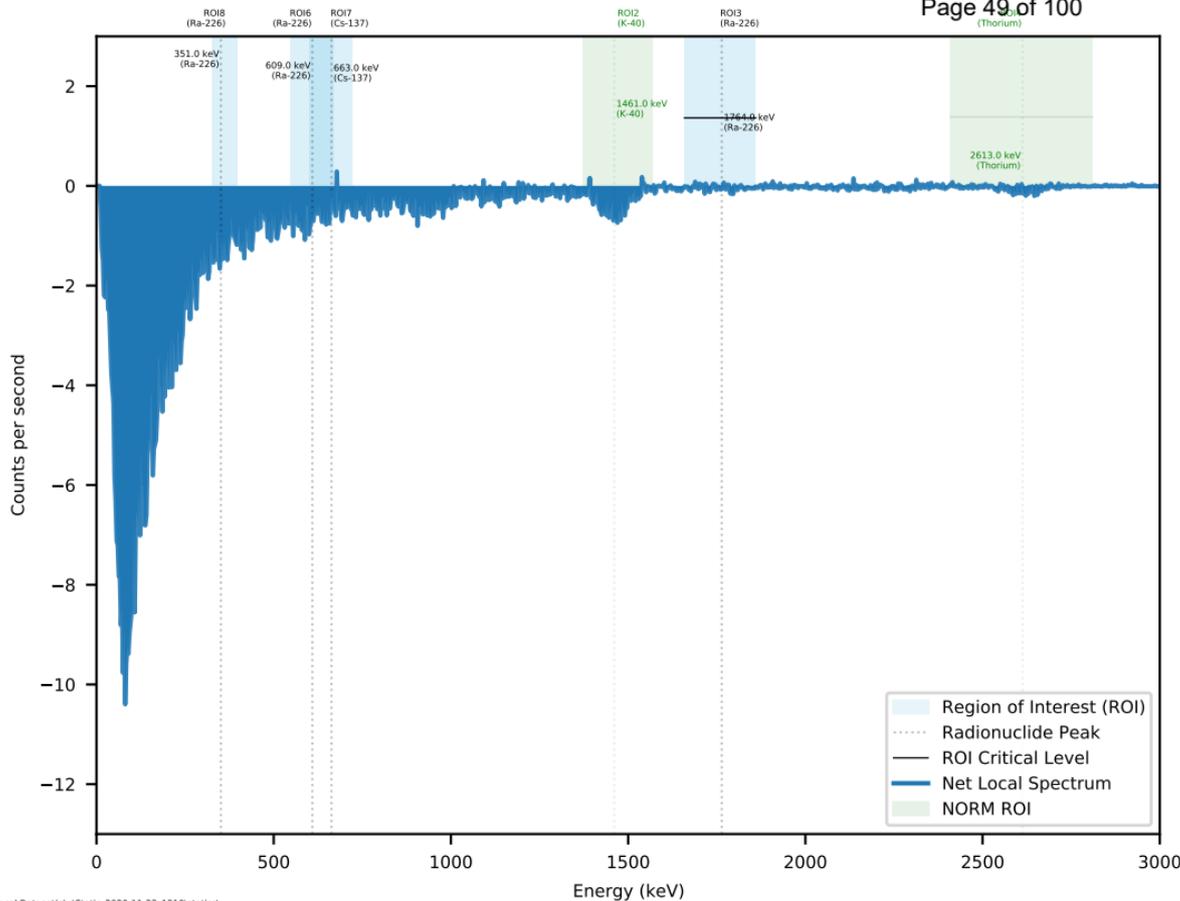














Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40590-1
Laboratory Sample Delivery Group: GJ46599766
Client Project/Site: HPNS-Parcel G 501197
Revision: 3

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/12/2021 4:45:37 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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results through
TotalAccess

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
SDG: GJ46599766

Job ID: 160-40590-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40590-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Revision 2- J flags applied to samples HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23)

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
SDG: GJ46599766

Job ID: 160-40590-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.1 C.

STRONTIUM-90 (GFPC)

Samples HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/30/2020, prepared on 12/03/2020 and analyzed on 12/14/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490804/22-A)

The strontium carrier recovery is outside the lower control limit (40%) for the following sample: (160-39992-A-30-D DU). The detection goal was not met for these samples due to the low carrier recovery from the presence of matrix interference apparent during the initial preparation of the sample. The QC associated with these samples fell within acceptable criteria demonstrating acceptable preparation and instrument performance. The data have been reported with this narrative.

The laboratory control sample (LCS) associated with the following samples falls below the lower limit for spike criteria (recovery is 74%; criteria is 75-125%): HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13), HPPG-SFU-TU108A-021 (160-40590-23), (160-39992-A-30-C) and (160-39992-A-30-D DU). The other QC associated with this batch (MB, RER for duplicate precision, carrier recoveries associated) fall within acceptable criteria demonstrating acceptable preparation and instrument performance. The LCS recovery is within statistical limits of 59-124%. The data have been reported with this narrative by client approval.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-043 (160-40590-1), HPPG-F-044 (160-40590-2), HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-002 (160-40590-4), HPPG-SFU-TU108A-003 (160-40590-5), HPPG-SFU-TU108A-004 (160-40590-6), HPPG-SFU-TU108A-005 (160-40590-7), HPPG-SFU-TU108A-006 (160-40590-8), HPPG-SFU-TU108A-007 (160-40590-9), HPPG-SFU-TU108A-008 (160-40590-10), HPPG-SFU-TU108A-009 (160-40590-11), HPPG-SFU-TU108A-010 (160-40590-12), HPPG-SFU-TU108A-011 (160-40590-13), HPPG-SFU-TU108A-012 (160-40590-14), HPPG-SFU-TU108A-013 (160-40590-15), HPPG-SFU-TU108A-014 (160-40590-16), HPPG-SFU-TU108A-015 (160-40590-17), HPPG-SFU-TU108A-016 (160-40590-18), HPPG-SFU-TU108A-017 (160-40590-19), HPPG-SFU-TU108A-018 (160-40590-20), HPPG-SFU-TU108A-019 (160-40590-21), HPPG-SFU-TU108A-020 (160-40590-22), HPPG-SFU-TU108A-021 (160-40590-23), HPPG-SFU-TU108A-022 (160-40590-24), HPPG-SFU-TU108A-023 (160-40590-25), HPPG-SFU-TU108A-024 (160-40590-26) and HPPG-SFU-TU108A-025 (160-40590-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/30/2020, prepared on 12/02/2020 and 12/03/2020 and analyzed on 12/23/2020 and 12/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Job ID: 160-40590-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 490768

The method blank (MB) z-score is within limits and is stored in the level IV raw data.(MB 160-490768/1-A)

Gamma prep batch 490771

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-490771 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-490771/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met for the duplicate associated with Prep Batch 160-490771: 160-40585-A-1-C DU. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The radium-226 detection goal of 0.200 pCi/g was not met for sample HPPG-SFU-TU108A-004 (160-40590-6) in batch 160-490771. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

Gamma prep batch 490802

The method blank (MB 160-490802/1-A) z-score associated with Prep Batch 160-490802 is within limits and is stored in the level IV raw data.

Gamma prep batch 490785

The method blank (MB 160-490785/1-A) z-score associated with Prep Batch 160-490785 is within limits and is stored in the level IV raw data.

The cesium-137 detection goal of 0.0700 pCi/g was not met for sample HPPG-SFU-TU108A-015 (160-40590-17) in batch 160-490785. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The following sample in batch 160-490785 exhibited a negative result greater in magnitude than the 3 sigma TPU for U-235: HPPG-SFU-TU108A-015 (160-40590-17). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-040

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 11/25/2020
Waybill Number: 4957 0225 6218
Lab Destination: Test America (St. Louis Lab)
 13715 Rider Trail North
 Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)								
HPPG-SFU-TU108A-007	11/23/2020	11:22	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-008	11/23/2020	11:36	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-009	11/23/2020	11:40	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-010	11/23/2020	11:32	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-011	11/23/2020	11:34	G	SO	1	16 oz. plastic jar	X		X					4	GJ46599766	
HPPG-SFU-TU108A-012	11/23/2020	11:37	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-013	11/23/2020	11:42	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-014	11/23/2020	11:43	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-015	11/23/2020	11:34	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-016	11/23/2020	11:40	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-017	11/23/2020	11:45	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-018	11/23/2020	11:47	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-019	11/23/2020	11:52	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-020	11/23/2020	11:49	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-021	11/23/2020	11:53	G	SO	1	16 oz. plastic jar	X		X					4	GJ46599766	
HPPG-SFU-TU108A-022	11/23/2020	11:45	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	
HPPG-SFU-TU108A-023	11/23/2020	12:08	G	SO	1	16 oz. plastic jar	X							4	GJ46599766	

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4/12/2021 (Rev. 3)





CHAIN OF CUSTODY

Ref. Document # 501197RSY-040

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
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Project Number: 501197
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Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 11/25/2020
Waybill Number: 4957 0225 6218
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

							Analysis Requested					Evidence Bag ID	Comment
Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)				Dose Rate uR/Hr			

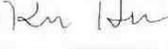
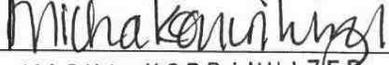
Sample ID	Collection Information			Matrix	# of Containers	Container Type
	Date	Time	Method			
HPPG-SFU-TU108A-024	11/23/2020	11:57	G	SO	1	16 oz. plastic jar
HPPG-SFU-TU108A-025	11/23/2020	12:02	G	SO	1	16 oz. plastic jar

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All Transfers for COC 501197RSY-040

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:07	Locked Storage(Kevin Hoch)		11/23/2020 17:07
Locked Storage(Kevin Hoch)		11/25/2020 07:36	Devin Lewis		11/25/2020 07:36
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB	 MICHA KORRINHIZER	11/27/2020 09:52



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40590-1

SDG Number: GJ46599766

Login Number: 40590**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Greer, Diane A**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Qualifiers

Rad

Qualifier	Qualifier Description
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
SDG: GJ46599766

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
SDG: GJ46599766

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40590-1	HPPG-F-043	Solid	11/23/20 11:43	11/27/20 09:12	
160-40590-2	HPPG-F-044	Solid	11/23/20 12:08	11/27/20 09:12	
160-40590-3	HPPG-SFU-TU108A-001	Solid	11/23/20 11:22	11/27/20 09:12	
160-40590-4	HPPG-SFU-TU108A-002	Solid	11/23/20 11:20	11/27/20 09:12	
160-40590-5	HPPG-SFU-TU108A-003	Solid	11/23/20 11:23	11/27/20 09:12	
160-40590-6	HPPG-SFU-TU108A-004	Solid	11/23/20 11:28	11/27/20 09:12	
160-40590-7	HPPG-SFU-TU108A-005	Solid	11/23/20 11:26	11/27/20 09:12	
160-40590-8	HPPG-SFU-TU108A-006	Solid	11/23/20 11:25	11/27/20 09:12	
160-40590-9	HPPG-SFU-TU108A-007	Solid	11/23/20 11:22	11/27/20 09:12	
160-40590-10	HPPG-SFU-TU108A-008	Solid	11/23/20 11:36	11/27/20 09:12	
160-40590-11	HPPG-SFU-TU108A-009	Solid	11/23/20 11:40	11/27/20 09:12	
160-40590-12	HPPG-SFU-TU108A-010	Solid	11/23/20 11:32	11/27/20 09:12	
160-40590-13	HPPG-SFU-TU108A-011	Solid	11/23/20 11:34	11/27/20 09:12	
160-40590-14	HPPG-SFU-TU108A-012	Solid	11/23/20 11:37	11/27/20 09:12	
160-40590-15	HPPG-SFU-TU108A-013	Solid	11/23/20 11:42	11/27/20 09:12	
160-40590-16	HPPG-SFU-TU108A-014	Solid	11/23/20 11:43	11/27/20 09:12	
160-40590-17	HPPG-SFU-TU108A-015	Solid	11/23/20 11:34	11/27/20 09:12	
160-40590-18	HPPG-SFU-TU108A-016	Solid	11/23/20 11:40	11/27/20 09:12	
160-40590-19	HPPG-SFU-TU108A-017	Solid	11/23/20 11:45	11/27/20 09:12	
160-40590-20	HPPG-SFU-TU108A-018	Solid	11/23/20 11:47	11/27/20 09:12	
160-40590-21	HPPG-SFU-TU108A-019	Solid	11/23/20 11:52	11/27/20 09:12	
160-40590-22	HPPG-SFU-TU108A-020	Solid	11/23/20 11:49	11/27/20 09:12	
160-40590-23	HPPG-SFU-TU108A-021	Solid	11/23/20 11:53	11/27/20 09:12	
160-40590-24	HPPG-SFU-TU108A-022	Solid	11/23/20 11:45	11/27/20 09:12	
160-40590-25	HPPG-SFU-TU108A-023	Solid	11/23/20 12:08	11/27/20 09:12	
160-40590-26	HPPG-SFU-TU108A-024	Solid	11/23/20 11:57	11/27/20 09:12	
160-40590-27	HPPG-SFU-TU108A-025	Solid	11/23/20 12:02	11/27/20 09:12	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-F-043

Lab Sample ID: 160-40590-1

Date Collected: 11/23/20 11:43

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.287		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Actinium-227	-0.299	U	0.597	0.598		0.361	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Bismuth-212	0.000	U	0.373	0.373		0.351	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Bismuth-214	0.251		0.0912	0.0949		0.0450	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Cesium-137	0.0241	U	0.0489	0.0490	0.0700	0.0379	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Lead-210	0.768		1.02	1.03		0.696	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Lead-212	0.250		0.0704	0.0775		0.0385	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Lead-214	0.268		0.0891	0.0933		0.0495	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Potassium-40	6.82		1.10	1.31		0.231	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Protactinium-231	0.0000000	U	2.20	2.20		1.82	pCi/g	12/02/20 14:03	12/23/20 11:22	1
	918									
Protactinium-234	-0.0170	U	0.0307	0.0308		0.221	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Radium-226	0.251		0.0912	0.0949	0.200	0.0450	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Radium-228	0.287		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Thallium-208	0.103		0.0370	0.0385		0.0131	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Thorium 228	0.250		0.0704	0.0775		0.0385	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Thorium-232	0.287		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Thorium-234	-0.741	U	0.506	0.513		0.506	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Uranium-235	-0.0334	U	0.112	0.112		0.456	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Uranium-238	-0.741	U	0.506	0.513		0.506	pCi/g	12/02/20 14:03	12/23/20 11:22	1

Client Sample ID: HPPG-F-044

Lab Sample ID: 160-40590-2

Date Collected: 11/23/20 12:08

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.215		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Actinium-227	-0.0927	U	0.306	0.306		0.268	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Bismuth-212	-0.0270	U	0.431	0.431		0.411	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Bismuth-214	0.258		0.0772	0.0818		0.0322	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Cesium-137	-0.0111	U	0.0434	0.0434	0.0700	0.0347	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-210	-0.337	U	1.26	1.26		1.02	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-212	0.279		0.0679	0.0769		0.0372	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-214	0.297		0.0757	0.0817		0.0373	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Potassium-40	7.64		1.08	1.33		0.235	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-231	0.000	U	0.323	0.323		1.61	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-234	0.102	U	0.168	0.168		0.137	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Radium-226	0.258		0.0772	0.0818	0.200	0.0322	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Radium-228	0.215		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thallium-208	0.124		0.0354	0.0376		0.00996	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium 228	0.279		0.0679	0.0769		0.0372	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium-232	0.215		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium-234	0.288	U	0.478	0.479		0.310	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-235	0.119	U	0.222	0.223		0.281	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-238	0.288	U	0.478	0.479		0.310	pCi/g	12/02/20 14:03	12/23/20 10:36	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-001

Lab Sample ID: 160-40590-3

Date Collected: 11/23/20 11:22

Matrix: Solid

Date Received: 11/27/20 09:12

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	-0.0138	U J	0.115	0.115	0.331	0.0957	pCi/g	12/03/20 11:35	12/14/20 17:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	104		40 - 110					12/03/20 11:35	12/14/20 17:10	1
Y Carrier	90.5		40 - 110					12/03/20 11:35	12/14/20 17:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Actinium-227	-0.281	U	0.546	0.547		0.316	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Bismuth-212	0.0291	U	0.574	0.574		0.470	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Bismuth-214	0.312		0.102	0.107		0.0469	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Cesium-137	-0.0223	U	0.0603	0.0603	0.0700	0.0482	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-210	-2.41	U	4.83	4.84		3.95	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-212	0.347		0.0658	0.0796		0.0277	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-214	0.308		0.0774	0.0838		0.0388	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Potassium-40	6.90		0.991	1.22		0.0829	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-231	0.402	U	1.47	1.47		1.64	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-234	0.0768	U	0.0681	0.0685		0.197	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Radium-226	0.312		0.102	0.107	0.200	0.0469	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Radium-228	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thallium-208	0.162		0.0496	0.0524		0.0157	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium 228	0.347		0.0658	0.0796		0.0277	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium-232	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium-234	0.225	U	0.351	0.352		0.931	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-235	0.0462	U	0.0901	0.0902		0.327	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-238	0.225	U	0.351	0.352		0.931	pCi/g	12/02/20 14:03	12/23/20 10:36	1

Client Sample ID: HPPG-SFU-TU108A-002

Lab Sample ID: 160-40590-4

Date Collected: 11/23/20 11:20

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Actinium-227	0.249	U	0.539	0.540		0.321	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Bismuth-212	-0.317	U	0.548	0.549		0.788	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Bismuth-214	0.365		0.151	0.156		0.0819	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Cesium-137	0.0116	U	0.0640	0.0640	0.0700	0.0511	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-210	0.858		1.03	1.03		0.677	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-212	0.388		0.0932	0.106		0.0421	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Lead-214	0.202		0.136	0.138		0.0790	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Potassium-40	7.99		1.72	1.91		0.476	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Protactinium-231	-0.851	U	2.37	2.38		1.91	pCi/g	12/02/20 14:03	12/23/20 10:02	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-002

Lab Sample ID: 160-40590-4

Date Collected: 11/23/20 11:20

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0830	U	0.115	0.115		0.182	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-226	0.365		0.151	0.156	0.200	0.0819	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-228	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thallium-208	0.145		0.0740	0.0756		0.0316	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium 228	0.388		0.0932	0.106		0.0421	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-232	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-234	0.364	U	0.511	0.513		0.394	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-235	0.0706	U	0.168	0.168		0.307	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-238	0.364	U	0.511	0.513		0.394	pCi/g	12/02/20 14:03	12/23/20 10:02	1

Client Sample ID: HPPG-SFU-TU108A-003

Lab Sample ID: 160-40590-5

Date Collected: 11/23/20 11:23

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Actinium-227	0.0121	U	0.0210	0.0211		0.384	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Bismuth-212	0.196	U	0.597	0.598		0.471	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Bismuth-214	0.487		0.121	0.131		0.0398	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Cesium-137	0.00960	U	0.0506	0.0506	0.0700	0.0406	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-210	0.478	U	1.33	1.33		0.860	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-212	0.357		0.0836	0.0955		0.0418	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-214	0.418		0.114	0.122		0.0444	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Potassium-40	8.19		1.28	1.53		0.259	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Protactinium-231	0.545	U	1.73	1.73		1.89	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Protactinium-234	-0.0367	U	0.0856	0.0857		0.247	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Radium-226	0.487		0.121	0.131	0.200	0.0398	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Radium-228	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thallium-208	0.115		0.0429	0.0446		0.0147	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium 228	0.357		0.0836	0.0955		0.0418	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium-232	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium-234	0.768		0.708	0.714		0.439	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Uranium-235	-0.0679	U	0.181	0.181		0.489	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Uranium-238	0.768		0.708	0.714		0.439	pCi/g	12/02/20 15:05	12/23/20 06:34	1

Client Sample ID: HPPG-SFU-TU108A-004

Lab Sample ID: 160-40590-6

Date Collected: 11/23/20 11:28

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.379		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Actinium-227	0.0210	U	0.563	0.563		0.350	pCi/g	12/02/20 15:05	12/23/20 07:09	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-004

Lab Sample ID: 160-40590-6

Date Collected: 11/23/20 11:28

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.000	U	0.384	0.384		0.621	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Bismuth-214	0.0240	U	0.262	0.262		0.214	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Cesium-137	-0.0261	U	0.0659	0.0660	0.0700	0.0515	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Lead-210	1.52		1.60	1.61		1.01	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Lead-212	0.213		0.0819	0.0856		0.0399	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Lead-214	0.0190	U	0.139	0.139		0.113	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Potassium-40	6.34		1.31	1.50		0.325	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Protactinium-231	-1.06	U	3.85	3.85		3.14	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Protactinium-234	0.0271	U	0.0530	0.0531		0.259	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Radium-226	0.0240	U	0.262	0.262	0.200	0.214	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Radium-228	0.379		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thallium-208	0.0802		0.0785	0.0791		0.0419	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thorium 228	0.213		0.0819	0.0856		0.0399	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thorium-232	0.379		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thorium-234	0.144	U	0.556	0.557		0.443	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Uranium-235	-0.246	U	0.124	0.127		0.533	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Uranium-238	0.144	U	0.556	0.557		0.443	pCi/g	12/02/20 15:05	12/23/20 07:09	1

Client Sample ID: HPPG-SFU-TU108A-005

Lab Sample ID: 160-40590-7

Date Collected: 11/23/20 11:26

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.295		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Actinium-227	0.169	U	0.375	0.375		0.224	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Bismuth-212	0.174	U	0.406	0.406		0.308	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Bismuth-214	0.326		0.0890	0.0952		0.0220	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Cesium-137	0.0141	U	0.0334	0.0334	0.0700	0.0255	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Lead-210	0.612	U	1.43	1.43		0.892	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Lead-212	0.350		0.0800	0.0919		0.0416	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Lead-214	0.472		0.106	0.117		0.0372	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Potassium-40	7.77		1.18	1.43		0.268	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Protactinium-231	-0.805	U	2.72	2.72		2.22	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Protactinium-234	-0.0199	U	0.0486	0.0486		0.169	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Radium-226	0.326		0.0890	0.0952	0.200	0.0220	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Radium-228	0.295		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thallium-208	0.157		0.0438	0.0468		0.0131	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thorium 228	0.350		0.0800	0.0919		0.0416	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thorium-232	0.295		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thorium-234	-0.340	U	0.489	0.490		0.631	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Uranium-235	-0.0500	U	0.108	0.108		0.259	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Uranium-238	-0.340	U	0.489	0.490		0.631	pCi/g	12/02/20 15:05	12/23/20 06:37	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-006

Lab Sample ID: 160-40590-8

Date Collected: 11/23/20 11:25

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Actinium-227	0.123	U	0.593	0.594		0.364	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Bismuth-212	0.336	U	0.650	0.651		0.497	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Bismuth-214	0.418		0.128	0.134		0.0557	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Cesium-137	-0.0304	U	0.0598	0.0598	0.0700	0.0461	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Lead-210	1.54		1.78	1.79		1.08	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Lead-212	0.382		0.0976	0.105		0.0541	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Lead-214	0.372		0.108	0.114		0.0578	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Potassium-40	8.86		1.36	1.63		0.122	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Protactinium-231	0.000	U	0.294	0.294		2.36	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Protactinium-234	-0.106	U	0.331	0.331		0.269	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Radium-226	0.418		0.128	0.134	0.200	0.0557	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Radium-228	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thallium-208	0.183		0.0570	0.0600		0.0139	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium 228	0.382		0.0976	0.105		0.0541	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium-232	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium-234	0.490		0.650	0.652		0.425	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Uranium-235	0.0350	U	0.0512	0.0513		0.495	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Uranium-238	0.490		0.650	0.652		0.425	pCi/g	12/03/20 09:54	12/24/20 16:58	1

Client Sample ID: HPPG-SFU-TU108A-007

Lab Sample ID: 160-40590-9

Date Collected: 11/23/20 11:22

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.176		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Actinium-227	0.170	U	0.256	0.257		0.234	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Bismuth-212	0.000	U	0.389	0.389		0.294	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Bismuth-214	0.267		0.0865	0.0909		0.0393	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Cesium-137	-0.0319	U	0.0578	0.0579	0.0700	0.0456	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Lead-210	-0.563	U	1.22	1.22		0.981	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Lead-212	0.312		0.0647	0.0763		0.0326	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Lead-214	0.314		0.0723	0.0793		0.0383	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Potassium-40	8.40		1.04	1.35		0.0753	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Protactinium-231	0.421	U	1.31	1.31		1.41	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Protactinium-234	-0.0242	U	0.0563	0.0563		0.171	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Radium-226	0.267		0.0865	0.0909	0.200	0.0393	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Radium-228	0.176		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thallium-208	0.0828		0.0448	0.0457		0.0202	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thorium 228	0.312		0.0647	0.0763		0.0326	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thorium-232	0.176		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thorium-234	0.162	U	0.378	0.378		0.711	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Uranium-235	0.0498	U	0.161	0.161		0.305	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Uranium-238	0.162	U	0.378	0.378		0.711	pCi/g	12/03/20 09:54	12/24/20 16:59	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-008

Lab Sample ID: 160-40590-10

Date Collected: 11/23/20 11:36

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Actinium-227	0.231	U	0.468	0.469		0.279	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Bismuth-212	0.280	U	0.555	0.556		0.420	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Bismuth-214	0.187		0.104	0.107		0.0561	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Cesium-137	0.0196	U	0.0620	0.0620	0.0700	0.0492	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Lead-210	-1.46	U	1.47	1.49		1.28	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Lead-212	0.149		0.0752	0.0772		0.0502	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Lead-214	0.203		0.0916	0.0945		0.0462	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Potassium-40	6.72		1.23	1.45		0.273	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Protactinium-231	0.652	U	1.94	1.94		1.57	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Protactinium-234	-0.0961	U	0.272	0.272		0.221	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Radium-226	0.187		0.104	0.107	0.200	0.0561	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Radium-228	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thallium-208	0.0693		0.0582	0.0588		0.0314	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thorium 228	0.149		0.0752	0.0772		0.0502	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thorium-232	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thorium-234	-0.491	U	0.679	0.682		0.705	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Uranium-235	0.114	U	0.408	0.408		0.405	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Uranium-238	-0.491	U	0.679	0.682		0.705	pCi/g	12/03/20 09:54	12/24/20 17:00	1

Client Sample ID: HPPG-SFU-TU108A-009

Lab Sample ID: 160-40590-11

Date Collected: 11/23/20 11:40

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.500		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Actinium-227	-0.303	U	0.386	0.387		0.336	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Bismuth-212	-0.162	U	0.235	0.235		0.522	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Bismuth-214	0.266		0.0962	0.100		0.0470	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Cesium-137	0.0209	U	0.0645	0.0645	0.0700	0.0516	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Lead-210	0.245	U	1.42	1.42		1.15	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Lead-212	0.403		0.0792	0.0949		0.0350	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Lead-214	0.298		0.0853	0.0908		0.0486	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Potassium-40	6.71		1.13	1.32		0.284	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Protactinium-231	0.000	U	0.732	0.732		1.89	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Protactinium-234	0.0811	U	0.212	0.212		0.161	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Radium-226	0.266		0.0962	0.100	0.200	0.0470	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Radium-228	0.500		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Thallium-208	0.115		0.0382	0.0401		0.0121	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Thorium 228	0.403		0.0792	0.0949		0.0350	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Thorium-232	0.500		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Thorium-234	-0.308	U	1.04	1.04		0.850	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Uranium-235	0.106	U	0.322	0.322		0.260	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Uranium-238	-0.308	U	1.04	1.04		0.850	pCi/g	12/03/20 09:54	12/24/20 19:07	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-010

Lab Sample ID: 160-40590-12

Date Collected: 11/23/20 11:32

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.314		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Actinium-227	0.123	U	0.485	0.485		0.296	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Bismuth-212	0.00739	U	0.558	0.558		0.458	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Bismuth-214	0.0576	U	0.169	0.169		0.161	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Cesium-137	0.0303	U	0.0598	0.0599	0.0700	0.0466	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Lead-210	1.10	U	1.44	1.45		1.13	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Lead-212	0.426		0.0807	0.0977		0.0313	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Lead-214	0.382		0.102	0.109		0.0408	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Potassium-40	8.61		1.30	1.57		0.291	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Protactinium-231	0.630	U	1.91	1.91		2.08	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Protactinium-234	0.0519	U	0.0826	0.0828		0.179	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Radium-226	0.0576	U	0.169	0.169	0.200	0.161	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Radium-228	0.314		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thallium-208	0.0934		0.0608	0.0616		0.0309	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thorium 228	0.426		0.0807	0.0977		0.0313	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thorium-232	0.314		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thorium-234	0.221	U	0.186	0.188		0.507	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Uranium-235	0.117	U	0.312	0.312		0.252	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Uranium-238	0.221	U	0.186	0.188		0.507	pCi/g	12/03/20 09:54	12/24/20 17:05	1

Client Sample ID: HPPG-SFU-TU108A-011

Lab Sample ID: 160-40590-13

Date Collected: 11/23/20 11:34

Matrix: Solid

Date Received: 11/27/20 09:12

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0226	U J	0.141	0.141	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:11	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	100		40 - 110					12/03/20 11:35	12/14/20 17:11	1
Y Carrier	90.8		40 - 110					12/03/20 11:35	12/14/20 17:11	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Actinium-227	0.235	U	0.507	0.508		0.302	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Bismuth-212	0.0460	U	0.842	0.842		0.689	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Bismuth-214	0.219		0.132	0.134		0.0770	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Cesium-137	0.0121	U	0.0812	0.0813	0.0700	0.0658	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Lead-210	0.906		1.02	1.03		0.654	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Lead-212	0.288		0.0823	0.0904		0.0434	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Lead-214	0.192		0.117	0.119		0.0649	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Potassium-40	6.22		1.26	1.41		0.148	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Protactinium-231	0.395	U	1.12	1.12		0.887	pCi/g	12/03/20 09:54	12/24/20 17:04	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-011

Lab Sample ID: 160-40590-13

Date Collected: 11/23/20 11:34

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.00421	U	0.0429	0.0429		0.146	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Radium-226	0.219		0.132	0.134	0.200	0.0770	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Radium-228	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thallium-208	0.132		0.0562	0.0578		0.0222	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium 228	0.288		0.0823	0.0904		0.0434	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium-232	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium-234	-0.636	U	0.541	0.545		0.672	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Uranium-235	0.129	U	0.249	0.250		0.223	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Uranium-238	-0.636	U	0.541	0.545		0.672	pCi/g	12/03/20 09:54	12/24/20 17:04	1

Client Sample ID: HPPG-SFU-TU108A-012

Lab Sample ID: 160-40590-14

Date Collected: 11/23/20 11:37

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Actinium-227	0.120	U	0.440	0.440		0.267	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Bismuth-212	0.896		0.465	0.474		0.159	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Bismuth-214	0.265		0.110	0.114		0.0542	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Cesium-137	0.0245	U	0.0494	0.0495	0.0700	0.0379	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-210	1.07		1.25	1.26		0.839	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-212	0.307		0.0816	0.0876		0.0436	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-214	0.407		0.101	0.109		0.0456	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Potassium-40	7.78		1.22	1.45		0.112	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Protactinium-231	0.0690	U	0.949	0.949		2.01	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Protactinium-234	0.101	U	0.185	0.185		0.213	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Radium-226	0.265		0.110	0.114	0.200	0.0542	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Radium-228	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thallium-208	0.129		0.0661	0.0674		0.0298	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium 228	0.307		0.0816	0.0876		0.0436	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium-232	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium-234	-0.830	U	0.583	0.591		0.797	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Uranium-235	-0.0205	U	0.0374	0.0374		0.393	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Uranium-238	-0.830	U	0.583	0.591		0.797	pCi/g	12/03/20 09:54	12/24/20 19:09	1

Client Sample ID: HPPG-SFU-TU108A-013

Lab Sample ID: 160-40590-15

Date Collected: 11/23/20 11:42

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.198		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Actinium-227	0.335		0.370	0.372		0.204	pCi/g	12/03/20 09:54	12/24/20 19:06	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-013

Lab Sample ID: 160-40590-15

Date Collected: 11/23/20 11:42

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.325	U	0.623	0.624		0.488	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Bismuth-214	0.279		0.0969	0.101		0.0443	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Cesium-137	-0.0342	U	0.0535	0.0536	0.0700	0.0415	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Lead-210	0.466	U	1.04	1.04		0.832	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Lead-212	0.341		0.0674	0.0806		0.0313	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Lead-214	0.262		0.0752	0.0800		0.0414	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Potassium-40	8.32		1.08	1.38		0.0818	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Protactinium-231	0.000	U	0.407	0.407		1.62	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Protactinium-234	0.0747	U	0.203	0.203		0.163	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Radium-226	0.279		0.0969	0.101	0.200	0.0443	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Radium-228	0.198		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thallium-208	0.128		0.0396	0.0418		0.0124	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thorium 228	0.341		0.0674	0.0806		0.0313	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thorium-232	0.198		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thorium-234	0.000	U	0.230	0.230		0.712	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Uranium-235	0.000	U	0.118	0.118		0.292	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Uranium-238	0.000	U	0.230	0.230		0.712	pCi/g	12/03/20 09:54	12/24/20 19:06	1

Client Sample ID: HPPG-SFU-TU108A-014

Lab Sample ID: 160-40590-16

Date Collected: 11/23/20 11:43

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.343		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Actinium-227	0.171	U	0.376	0.376		0.225	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Bismuth-212	0.213	U	0.567	0.567		0.446	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Bismuth-214	0.314		0.102	0.107		0.0339	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Cesium-137	0.00808	U	0.0427	0.0427	0.0700	0.0344	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Lead-210	0.983		0.986	0.993		0.663	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Lead-212	0.234		0.0678	0.0743		0.0382	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Lead-214	0.285		0.0925	0.0971		0.0406	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Potassium-40	7.06		1.10	1.32		0.254	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Protactinium-231	0.519	U	1.42	1.42		1.55	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Protactinium-234	-0.0690	U	0.169	0.169		0.136	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Radium-226	0.314		0.102	0.107	0.200	0.0339	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Radium-228	0.343		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thallium-208	0.0833		0.0386	0.0396		0.0166	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thorium 228	0.234		0.0678	0.0743		0.0382	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thorium-232	0.343		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thorium-234	0.247	U	0.375	0.376		0.300	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Uranium-235	0.0963	U	0.209	0.209		0.215	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Uranium-238	0.247	U	0.375	0.376		0.300	pCi/g	12/03/20 09:54	12/24/20 19:03	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-015

Lab Sample ID: 160-40590-17

Date Collected: 11/23/20 11:34

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Actinium-227	0.107	U	0.357	0.357		0.396	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Bismuth-212	0.000	U	0.300	0.300		0.864	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Bismuth-214	0.271		0.129	0.133		0.0622	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Cesium-137	0.0233	U	0.0884	0.0884	0.0700	0.0709	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Lead-210	0.428	U	1.85	1.85		1.22	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Lead-212	0.297		0.101	0.107		0.0609	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Lead-214	0.400		0.146	0.153		0.0833	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Potassium-40	8.84		1.56	1.86		0.335	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Protactinium-231	-0.700	U	3.20	3.20		2.61	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Protactinium-234	-0.138	U	0.420	0.420		0.342	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Radium-226	0.271		0.129	0.133	0.200	0.0622	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Radium-228	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thallium-208	0.144		0.0717	0.0736		0.0311	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium 228	0.297		0.101	0.107		0.0609	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium-232	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium-234	0.821		0.647	0.655		0.408	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Uranium-235	-0.261	U	0.112	0.116		0.592	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Uranium-238	0.821		0.647	0.655		0.408	pCi/g	12/03/20 09:54	12/24/20 19:41	1

Client Sample ID: HPPG-SFU-TU108A-016

Lab Sample ID: 160-40590-18

Date Collected: 11/23/20 11:40

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.165		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Actinium-227	0.0423	U	0.432	0.432		0.267	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Bismuth-212	-0.405	U	0.713	0.715		0.575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Bismuth-214	0.244		0.100	0.103		0.0575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Cesium-137	0.0107	U	0.0635	0.0635	0.0700	0.0515	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Lead-210	0.755		0.954	0.958		0.647	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Lead-212	0.315		0.0844	0.0937		0.0393	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Lead-214	0.322		0.115	0.119		0.0733	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Potassium-40	6.79		1.10	1.30		0.262	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Protactinium-231	0.528	U	1.69	1.69		1.37	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Protactinium-234	-0.0155	U	0.0358	0.0358		0.140	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Radium-226	0.244		0.100	0.103	0.200	0.0575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Radium-228	0.165		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thallium-208	0.128		0.0397	0.0419		0.0128	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thorium 228	0.315		0.0844	0.0937		0.0393	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thorium-232	0.165		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thorium-234	-0.332	U	0.489	0.490		0.658	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Uranium-235	0.000	U	0.113	0.113		0.213	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Uranium-238	-0.332	U	0.489	0.490		0.658	pCi/g	12/03/20 11:24	12/24/20 08:20	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-017

Lab Sample ID: 160-40590-19

Date Collected: 11/23/20 11:45

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Actinium-227	-0.250	U	0.492	0.493		0.362	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Bismuth-212	-0.371	U	0.416	0.418		0.571	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Bismuth-214	0.322		0.0979	0.103		0.0468	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Cesium-137	-0.0410	U	0.0714	0.0715	0.0700	0.0560	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Lead-210	1.07		1.21	1.21		0.775	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Lead-212	0.295		0.0754	0.0845		0.0399	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Lead-214	0.338		0.0974	0.104		0.0440	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Potassium-40	6.32		1.31	1.46		0.441	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Protactinium-231	0.000	U	0.574	0.574		1.89	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Protactinium-234	0.0969	U	0.163	0.164		0.142	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Radium-226	0.322		0.0979	0.103	0.200	0.0468	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Radium-228	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thallium-208	0.132		0.0453	0.0474		0.0173	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium 228	0.295		0.0754	0.0845		0.0399	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium-232	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium-234	0.336		0.465	0.466		0.336	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Uranium-235	0.105	U	0.268	0.268		0.215	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Uranium-238	0.336		0.465	0.466		0.336	pCi/g	12/03/20 11:24	12/24/20 08:54	1

Client Sample ID: HPPG-SFU-TU108A-018

Lab Sample ID: 160-40590-20

Date Collected: 11/23/20 11:47

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.198		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Actinium-227	-0.179	U	0.462	0.462		0.342	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Bismuth-212	-0.204	U	0.487	0.488		0.523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Bismuth-214	0.286		0.127	0.130		0.0523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Cesium-137	-0.0222	U	0.0527	0.0528	0.0700	0.0414	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Lead-210	0.295	U	1.07	1.07		0.764	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Lead-212	0.234		0.0707	0.0770		0.0406	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Lead-214	0.197		0.104	0.106		0.0516	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Potassium-40	7.04		1.23	1.43		0.356	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Protactinium-231	0.000	U	0.191	0.191		1.87	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Protactinium-234	0.0448	U	0.0967	0.0968		0.142	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Radium-226	0.286		0.127	0.130	0.200	0.0523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Radium-228	0.198		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thallium-208	0.0988		0.0389	0.0402		0.0160	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thorium 228	0.234		0.0707	0.0770		0.0406	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thorium-232	0.198		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thorium-234	-0.339	U	0.772	0.773		0.634	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Uranium-235	0.0660	U	0.171	0.171		0.265	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Uranium-238	-0.339	U	0.772	0.773		0.634	pCi/g	12/03/20 11:24	12/24/20 09:34	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-019

Lab Sample ID: 160-40590-21

Date Collected: 11/23/20 11:52

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.416		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Actinium-227	0.0746	U	0.209	0.209		0.303	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Bismuth-212	0.254	U	0.761	0.761		0.607	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Bismuth-214	0.324		0.0917	0.0977		0.0205	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Cesium-137	-0.00498	U	0.0648	0.0648	0.0700	0.0530	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Lead-210	1.13		1.17	1.18		0.760	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Lead-212	0.302		0.0766	0.0860		0.0407	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Lead-214	0.332		0.103	0.108		0.0443	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Potassium-40	8.45		1.25	1.52		0.275	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Protactinium-231	0.000	U	0.762	0.762		1.90	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Protactinium-234	-0.0854	U	0.209	0.209		0.169	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Radium-226	0.324		0.0917	0.0977	0.200	0.0205	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Radium-228	0.416		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thallium-208	0.166		0.0508	0.0536		0.0178	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thorium 228	0.302		0.0766	0.0860		0.0407	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thorium-232	0.416		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thorium-234	-0.483	U	0.842	0.844		0.678	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Uranium-235	0.000	U	0.173	0.173		0.253	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Uranium-238	-0.483	U	0.842	0.844		0.678	pCi/g	12/03/20 11:24	12/24/20 10:21	1

Client Sample ID: HPPG-SFU-TU108A-020

Lab Sample ID: 160-40590-22

Date Collected: 11/23/20 11:49

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.425		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Actinium-227	0.153	U	0.329	0.329		0.313	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Bismuth-212	0.178	U	0.477	0.477		0.370	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Bismuth-214	0.250		0.0854	0.0892		0.0281	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Cesium-137	0.00194	U	0.0554	0.0554	0.0700	0.0455	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Lead-210	0.138	U	0.973	0.973		0.712	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Lead-212	0.297		0.0763	0.0854		0.0409	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Lead-214	0.158		0.111	0.113		0.0810	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Potassium-40	6.31		1.09	1.27		0.275	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Protactinium-231	0.486	U	1.59	1.59		1.74	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Protactinium-234	0.0181	U	0.0319	0.0319		0.159	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Radium-226	0.250		0.0854	0.0892	0.200	0.0281	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Radium-228	0.425		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thallium-208	0.103		0.0456	0.0468		0.0203	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thorium 228	0.297		0.0763	0.0854		0.0409	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thorium-232	0.425		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thorium-234	0.172	U	0.354	0.354		0.276	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Uranium-235	0.118	U	0.328	0.328		0.232	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Uranium-238	0.172	U	0.354	0.354		0.276	pCi/g	12/03/20 11:24	12/24/20 10:58	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-021

Lab Sample ID: 160-40590-23

Date Collected: 11/23/20 11:53

Matrix: Solid

Date Received: 11/27/20 09:12

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.0302	U J	0.142	0.142	0.331	0.114	pCi/g	12/03/20 11:35	12/14/20 17:12	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	99.9		40 - 110					12/03/20 11:35	12/14/20 17:12	1
Y Carrier	92.0		40 - 110					12/03/20 11:35	12/14/20 17:12	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.148		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Actinium-227	0.557		0.407	0.411		0.217	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Bismuth-212	0.216	U	0.498	0.499		0.381	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Bismuth-214	0.0543	U	0.139	0.139		0.171	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Cesium-137	-0.0217	U	0.0837	0.0838	0.0700	0.0676	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Lead-210	-0.713	U	1.67	1.68		1.41	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Lead-212	0.325		0.0768	0.0840		0.0354	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Lead-214	0.349		0.0975	0.104		0.0498	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Potassium-40	7.36		1.54	1.71		0.473	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Protactinium-231	0.582	U	1.76	1.76		1.93	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Protactinium-234	-0.0931	U	0.282	0.282		0.230	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Radium-226	0.0543	U	0.139	0.139	0.200	0.171	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Radium-228	0.148		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thallium-208	0.119		0.0382	0.0401		0.00713	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thorium 228	0.325		0.0768	0.0840		0.0354	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thorium-232	0.148		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thorium-234	-0.177	U	0.875	0.876		0.725	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Uranium-235	0.0225	U	0.210	0.210		0.371	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Uranium-238	-0.177	U	0.875	0.876		0.725	pCi/g	12/03/20 11:24	12/24/20 11:09	1

Client Sample ID: HPPG-SFU-TU108A-022

Lab Sample ID: 160-40590-24

Date Collected: 11/23/20 11:45

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Actinium-227	0.0760	U	0.518	0.518		0.375	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Bismuth-212	0.564	U	1.12	1.13		0.885	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Bismuth-214	0.318		0.125	0.130		0.0583	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Cesium-137	-0.0493	U	0.0887	0.0889	0.0700	0.0480	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Lead-210	1.29		1.57	1.58		0.997	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Lead-212	0.304		0.0859	0.0930		0.0450	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Lead-214	0.302		0.112	0.117		0.0557	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Potassium-40	8.41		1.45	1.74		0.306	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Protactinium-231	0.662	U	2.17	2.17		2.33	pCi/g	12/03/20 11:24	12/24/20 10:42	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-022

Lab Sample ID: 160-40590-24

Date Collected: 11/23/20 11:45

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0976	U	0.225	0.225		0.238	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Radium-226	0.318		0.125	0.130	0.200	0.0583	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Radium-228	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thallium-208	0.0987		0.0440	0.0454		0.0171	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium 228	0.304		0.0859	0.0930		0.0450	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium-232	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium-234	0.300	U	0.574	0.575		0.404	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Uranium-235	-0.204	U	0.274	0.275		0.437	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Uranium-238	0.300	U	0.574	0.575		0.404	pCi/g	12/03/20 11:24	12/24/20 10:42	1

Client Sample ID: HPPG-SFU-TU108A-023

Lab Sample ID: 160-40590-25

Date Collected: 11/23/20 12:08

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Actinium-227	0.169	U	0.408	0.409		0.246	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Bismuth-212	-0.0722	U	0.628	0.628		0.541	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Bismuth-214	0.424		0.0993	0.109		0.0217	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Cesium-137	0.0196	U	0.0428	0.0428	0.0700	0.0331	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-210	1.27		1.06	1.07		0.673	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-212	0.295		0.0736	0.0829		0.0389	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-214	0.291		0.0911	0.0960		0.0407	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Potassium-40	7.48		1.15	1.38		0.263	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Protactinium-231	0.000	U	0.718	0.718		1.80	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Protactinium-234	0.0929	U	0.0515	0.0524		0.169	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Radium-226	0.424		0.0993	0.109	0.200	0.0217	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Radium-228	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thallium-208	0.105		0.0466	0.0478		0.0223	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium 228	0.295		0.0736	0.0829		0.0389	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium-232	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium-234	0.188	U	0.389	0.389		0.306	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Uranium-235	-0.00798	U	0.0125	0.0125		0.235	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Uranium-238	0.188	U	0.389	0.389		0.306	pCi/g	12/03/20 11:24	12/24/20 12:21	1

Client Sample ID: HPPG-SFU-TU108A-024

Lab Sample ID: 160-40590-26

Date Collected: 11/23/20 11:57

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.403		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Actinium-227	0.160	U	0.299	0.299		0.302	pCi/g	12/03/20 11:24	12/24/20 10:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Client Sample ID: HPPG-SFU-TU108A-024

Lab Sample ID: 160-40590-26

Date Collected: 11/23/20 11:57

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.410	U	0.720	0.721		0.713	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Bismuth-214	0.367		0.151	0.155		0.0793	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Cesium-137	-0.0334	U	0.0502	0.0503	0.0700	0.0509	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Lead-210	1.28		1.45	1.46		0.851	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Lead-212	0.267		0.0811	0.0882		0.0400	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Lead-214	0.239		0.110	0.113		0.0738	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Potassium-40	8.00		1.56	1.76		0.283	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Protactinium-231	0.359	U	1.50	1.50		1.85	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Protactinium-234	-0.0641	U	0.211	0.211		0.171	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Radium-226	0.367		0.151	0.155	0.200	0.0793	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Radium-228	0.403		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Thallium-208	0.174		0.0655	0.0679		0.0251	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Thorium 228	0.267		0.0811	0.0882		0.0400	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Thorium-232	0.403		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Thorium-234	0.283	U	0.480	0.481		0.381	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Uranium-235	0.0176	U	0.0285	0.0285		0.290	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Uranium-238	0.283	U	0.480	0.481		0.381	pCi/g	12/03/20 11:24	12/24/20 10:22	1

Client Sample ID: HPPG-SFU-TU108A-025

Lab Sample ID: 160-40590-27

Date Collected: 11/23/20 12:02

Matrix: Solid

Date Received: 11/27/20 09:12

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.469		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Actinium-227	0.0266	U	0.448	0.448		0.265	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Bismuth-212	0.250	U	0.691	0.691		0.551	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Bismuth-214	0.228		0.0823	0.0856		0.0378	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Cesium-137	0.0180	U	0.0451	0.0452	0.0700	0.0355	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Lead-210	0.242	U	1.06	1.06		0.859	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Lead-212	0.286		0.0649	0.0747		0.0322	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Lead-214	0.317		0.0836	0.0899		0.0531	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Potassium-40	7.12		1.06	1.29		0.240	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Protactinium-231	0.184	U	1.01	1.01		1.56	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Protactinium-234	-0.0238	U	0.0496	0.0497		0.175	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Radium-226	0.228		0.0823	0.0856	0.200	0.0378	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Radium-228	0.469		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Thallium-208	0.147		0.0386	0.0415		0.0102	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Thorium 228	0.286		0.0649	0.0747		0.0322	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Thorium-232	0.469		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Thorium-234	-0.0412	U	0.110	0.110		0.707	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Uranium-235	0.0105	U	0.145	0.145		0.315	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Uranium-238	-0.0412	U	0.110	0.110		0.707	pCi/g	12/03/20 11:24	12/24/20 11:08	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-490804/22-A
Matrix: Solid
Analysis Batch: 491746

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490804

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.1449		0.155	0.156	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:12	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					12/03/20 11:35	12/14/20 17:12	1
Y Carrier	92.7		40 - 110					12/03/20 11:35	12/14/20 17:12	1

Lab Sample ID: LCS 160-490804/1-A
Matrix: Solid
Analysis Batch: 491659

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490804

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.76	5.722	J	0.669	0.331	0.147	pCi/g	74	75 - 125
Carrier	%Yield	Qualifier	Limits						
Sr Carrier	80.9		40 - 110						
Y Carrier	93.8		40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-490768/1-A
Matrix: Solid
Analysis Batch: 492829

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490768

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Actinium-227	0.08637	U	0.222	0.222		0.306	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Bismuth-212	0.3625	U	0.680	0.681		0.513	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Bismuth-214	-0.01490	U	0.0268	0.0268		0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Cesium-137	-0.01957	U	0.0651	0.0651	0.0700	0.0357	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Lead-210	0.2513	U	1.22	1.22		0.879	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Lead-212	-0.007941	U	0.0847	0.0847		0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Lead-214	-0.01332	U	0.0954	0.0954		0.0787	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Potassium-40	0.4500		0.537	0.539		0.339	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Protactinium-231	0.7858	U	0.759	0.763		2.03	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Protactinium-234	-0.09659	U	0.216	0.216		0.242	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Radium-226	-0.01490	U	0.0268	0.0268	0.200	0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Radium-228	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thallium-208	0.03546		0.0510	0.0511		0.0192	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium 228	-0.007941	U	0.0847	0.0847		0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium-232	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Thorium-234	0.1218	U	0.618	0.618		0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Uranium-235	0.1931	U	0.260	0.261		0.218	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Uranium-238	0.1218	U	0.618	0.618		0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490768/2-A
 Matrix: Solid
 Analysis Batch: 492822

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 490768

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	97.41		11.5		0.632	pCi/g	101	87 - 116	
Cesium-137	26.7	29.43		3.09	0.0700	0.111	pCi/g	110	87 - 120	
Cobalt-60	9.43	9.871		1.04		0.0464	pCi/g	105	87 - 115	

Lab Sample ID: 160-40590-4 DU
 Matrix: Solid
 Analysis Batch: 492831

Client Sample ID: HPPG-SFU-TU108A-002
 Prep Type: Total/NA
 Prep Batch: 490768

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Actinium-227	0.249	U	-0.3844	U	0.737		0.487	pCi/g	0.50	1
Bismuth-212	-0.317	U	-0.2971	U	1.03		0.824	pCi/g	0.01	1
Bismuth-214	0.365		0.2373		0.139		0.210	pCi/g	0.43	1
Cesium-137	0.0116	U	0.02156	U	0.0837	0.0700	0.0671	pCi/g	0.07	1
Lead-210	0.858		2.034		1.80		1.08	pCi/g	0.42	1
Lead-212	0.388		0.3717		0.121		0.0690	pCi/g	0.07	1
Lead-214	0.202		0.4619		0.173		0.0715	pCi/g	0.84	1
Potassium-40	7.99		8.862		1.83		0.320	pCi/g	0.23	1
Protactinium-231	-0.851	U	0.1210	U	0.0930		3.01	pCi/g	0.39	1
Protactinium-234	0.0830	U	0.09286	U	0.0570		0.300	pCi/g	0.06	1
Radium-226	0.365		0.2373		0.139	0.200	0.210	pCi/g	0.43	1
Radium-228	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Thallium-208	0.145		0.1901		0.0691		0.0242	pCi/g	0.31	1
Thorium 228	0.388		0.3717		0.121		0.0690	pCi/g	0.07	1
Thorium-232	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Thorium-234	0.364	U	0.5512		0.693		0.479	pCi/g	0.16	1
Uranium-235	0.0706	U	0.1004	U	0.201		0.542	pCi/g	0.08	1
Uranium-238	0.364	U	0.5512		0.693		0.479	pCi/g	0.16	1

Lab Sample ID: MB 160-490771/1-A
 Matrix: Solid
 Analysis Batch: 492822

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 490771

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.2919	U	0.601	0.601		0.356	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Bismuth-212	0.4349	U	0.878	0.879		0.675	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Bismuth-214	0.09028	U	0.0544	0.0552		0.235	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Cesium-137	-0.003155	U	0.0599	0.0599	0.0700	0.0489	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Lead-210	0.6968	U	1.25	1.25		0.908	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Lead-212	0.0000164	U	0.101	0.101		0.0829	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Lead-214	0.02953	U	0.0855	0.0855		0.0648	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Potassium-40	0.4077		0.333	0.335		0.158	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Protactinium-231	0.0000	U	0.311	0.311		2.16	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Protactinium-234	-0.09742	U	0.297	0.297		0.240	pCi/g	12/02/20 15:05	12/23/20 16:29	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-490771/1-A
Matrix: Solid
Analysis Batch: 492822

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490771

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.09028	U	0.0544	0.0552	0.200	0.235	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Radium-228	0.1200		0.187	0.187		0.0913	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thallium-208	0.04196		0.0639	0.0640		0.0298	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thorium 228	0.0000164	U	0.101	0.101		0.0829	pCi/g	12/02/20 15:05	12/23/20 16:29	1
	7									
Thorium-232	0.1200		0.187	0.187		0.0913	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thorium-234	0.2125	U	0.548	0.549		0.379	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Uranium-235	0.08877	U	0.181	0.182		0.439	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Uranium-238	0.2125	U	0.548	0.549		0.379	pCi/g	12/02/20 15:05	12/23/20 16:29	1

Lab Sample ID: LCS 160-490771/2-A
Matrix: Solid
Analysis Batch: 492824

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490771

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	92.86		9.75		0.524	pCi/g	96	87 - 116
Cesium-137	26.7	26.07		2.77	0.0700	0.0790	pCi/g	98	87 - 120
Cobalt-60	9.43	8.837		0.929		0.0279	pCi/g	94	87 - 115

Lab Sample ID: MB 160-490785/1-A
Matrix: Solid
Analysis Batch: 492980

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490785

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.06936	U	0.114	0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Actinium-227	-0.3769	U	0.698	0.699		0.395	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Bismuth-212	-0.5112	U	1.05	1.05		0.808	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Bismuth-214	-0.07410	U	0.156	0.156		0.180	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Cesium-137	-0.04068	U	0.0658	0.0660	0.0700	0.0486	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-210	-0.5627	U	1.44	1.44		1.21	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-212	-0.04310	U	0.0838	0.0840		0.109	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-214	-0.09477	U	0.179	0.179		0.111	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Potassium-40	-0.8061	U	0.606	0.612		0.741	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Protactinium-231	0.0000003	U	3.25	3.25		2.67	pCi/g	12/03/20 09:54	12/24/20 11:12	1
	159									
Protactinium-234	-0.005059	U	0.226	0.226		0.186	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Radium-226	-0.07410	U	0.156	0.156	0.200	0.180	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Radium-228	0.06936	U	0.114	0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thallium-208	0.005106	U	0.0111	0.0111		0.0405	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium 228	-0.04310	U	0.0838	0.0840		0.109	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium-232	0.06936	U	0.114	0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium-234	-0.6086	U	0.727	0.730		0.908	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Uranium-235	0.09822	U	0.193	0.193		0.475	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Uranium-238	-0.6086	U	0.727	0.730		0.908	pCi/g	12/03/20 09:54	12/24/20 11:12	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490785/2-A
 Matrix: Solid
 Analysis Batch: 492976

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 490785

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	93.81		9.84		0.496	pCi/g	97	87 - 116	
Cesium-137	26.7	25.10		2.67	0.0700	0.0826	pCi/g	94	87 - 120	
Cobalt-60	9.43	9.022		0.946		0.00975	pCi/g	96	87 - 115	

Lab Sample ID: 160-40590-17 DU
 Matrix: Solid
 Analysis Batch: 493018

Client Sample ID: HPPG-SFU-TU108A-015
 Prep Type: Total/NA
 Prep Batch: 490785

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.456		0.3761		0.134		0.0837	pCi/g	0.21	1
Actinium-227	0.107	U	0.2493	U	0.498		0.296	pCi/g	0.17	1
Bismuth-212	0.000	U	0.3702	U	0.713		0.540	pCi/g	0.37	1
Bismuth-214	0.271		0.4143		0.142		0.0519	pCi/g	0.52	1
Cesium-137	0.0233	U	0.03586	U	0.0750	0.0700	0.0582	pCi/g	0.08	1
Lead-210	0.428	U	-1.225	U	2.06		1.74	pCi/g	0.42	1
Lead-212	0.297		0.4150		0.0965		0.0350	pCi/g	0.58	1
Lead-214	0.400		0.4514		0.112		0.0505	pCi/g	0.19	1
Potassium-40	8.84		9.438		1.89		0.235	pCi/g	0.16	1
Protactinium-231	-0.700	U	-1.002	U	3.37		2.75	pCi/g	0.05	1
Protactinium-234	-0.138	U	-0.01142	U	0.0337		0.236	pCi/g	0.28	1
Radium-226	0.271		0.4143		0.142	0.200	0.0519	pCi/g	0.52	1
Radium-228	0.456		0.3761		0.134		0.0837	pCi/g	0.21	1
Thallium-208	0.144		0.1508		0.125		0.0462	pCi/g	0.03	1
Thorium 228	0.297		0.4150		0.0965		0.0350	pCi/g	0.58	1
Thorium-232	0.456		0.3761		0.134		0.0837	pCi/g	0.21	1
Thorium-234	0.821		0.1675	U	0.469		0.383	pCi/g	0.58	1
Uranium-235	-0.261	U	0.08968	U	0.499		0.408	pCi/g	0.57	1
Uranium-238	0.821		0.1675	U	0.469		0.383	pCi/g	0.58	1

Lab Sample ID: MB 160-490802/1-A
 Matrix: Solid
 Analysis Batch: 492976

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 490802

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.3031	U	0.525	0.526		0.335	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Bismuth-212	-0.3011	U	0.398	0.399		0.562	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Bismuth-214	-0.06394	U	0.114	0.114		0.134	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Cesium-137	0.0000	U	0.00946	0.00946	0.0700	0.0181	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Lead-210	0.2354	U	0.771	0.771		0.611	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Lead-212	-0.004504	U	0.0798	0.0798		0.0671	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Lead-214	-0.04921	U	0.0735	0.0737		0.0644	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Potassium-40	0.09750	U	0.430	0.430		0.327	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Protactinium-231	0.2248	U	0.795	0.795		1.45	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Protactinium-234	0.01682	U	0.0825	0.0825		0.0661	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Radium-226	-0.06394	U	0.114	0.114	0.200	0.134	pCi/g	12/03/20 11:24	12/24/20 10:35	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-490802/1-A
Matrix: Solid
Analysis Batch: 492976

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490802

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert.	Uncert.						
Radium-228	-0.03762	U	0.218	0.218		0.113	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thallium-208	0.007245	U	0.0113	0.0113		0.0301	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium 228	-0.004504	U	0.0798	0.0798		0.0671	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium-232	-0.03762	U	0.218	0.218		0.113	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium-234	0.0000	U	0.143	0.143		0.539	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Uranium-235	0.05006	U	0.229	0.229		0.185	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Uranium-238	0.0000	U	0.143	0.143		0.539	pCi/g	12/03/20 11:24	12/24/20 10:35	1

Lab Sample ID: LCS 160-490802/2-A
Matrix: Solid
Analysis Batch: 492974

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490802

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	91.19		9.58		0.524	pCi/g	95	87 - 116
Cesium-137	26.7	25.30		2.69	0.0700	0.0802	pCi/g	95	87 - 120
Cobalt-60	9.43	8.864		0.930		0.0237	pCi/g	94	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Rad

Leach Batch: 490566

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-1	HPPG-F-043	Total/NA	Solid	Dry and Grind	
160-40590-2	HPPG-F-044	Total/NA	Solid	Dry and Grind	
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	Dry and Grind	
160-40590-4	HPPG-SFU-TU108A-002	Total/NA	Solid	Dry and Grind	
160-40590-5	HPPG-SFU-TU108A-003	Total/NA	Solid	Dry and Grind	
160-40590-6	HPPG-SFU-TU108A-004	Total/NA	Solid	Dry and Grind	
160-40590-7	HPPG-SFU-TU108A-005	Total/NA	Solid	Dry and Grind	
160-40590-8	HPPG-SFU-TU108A-006	Total/NA	Solid	Dry and Grind	
160-40590-4 DU	HPPG-SFU-TU108A-002	Total/NA	Solid	Dry and Grind	

Leach Batch: 490573

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-9	HPPG-SFU-TU108A-007	Total/NA	Solid	Dry and Grind	
160-40590-10	HPPG-SFU-TU108A-008	Total/NA	Solid	Dry and Grind	
160-40590-11	HPPG-SFU-TU108A-009	Total/NA	Solid	Dry and Grind	
160-40590-12	HPPG-SFU-TU108A-010	Total/NA	Solid	Dry and Grind	
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	Dry and Grind	
160-40590-14	HPPG-SFU-TU108A-012	Total/NA	Solid	Dry and Grind	
160-40590-15	HPPG-SFU-TU108A-013	Total/NA	Solid	Dry and Grind	
160-40590-16	HPPG-SFU-TU108A-014	Total/NA	Solid	Dry and Grind	
160-40590-17	HPPG-SFU-TU108A-015	Total/NA	Solid	Dry and Grind	
160-40590-18	HPPG-SFU-TU108A-016	Total/NA	Solid	Dry and Grind	
160-40590-19	HPPG-SFU-TU108A-017	Total/NA	Solid	Dry and Grind	
160-40590-20	HPPG-SFU-TU108A-018	Total/NA	Solid	Dry and Grind	
160-40590-21	HPPG-SFU-TU108A-019	Total/NA	Solid	Dry and Grind	
160-40590-22	HPPG-SFU-TU108A-020	Total/NA	Solid	Dry and Grind	
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	Dry and Grind	
160-40590-24	HPPG-SFU-TU108A-022	Total/NA	Solid	Dry and Grind	
160-40590-25	HPPG-SFU-TU108A-023	Total/NA	Solid	Dry and Grind	
160-40590-26	HPPG-SFU-TU108A-024	Total/NA	Solid	Dry and Grind	
160-40590-27	HPPG-SFU-TU108A-025	Total/NA	Solid	Dry and Grind	
160-40590-17 DU	HPPG-SFU-TU108A-015	Total/NA	Solid	Dry and Grind	

Prep Batch: 490768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-1	HPPG-F-043	Total/NA	Solid	Fill_Geo-21	490566
160-40590-2	HPPG-F-044	Total/NA	Solid	Fill_Geo-21	490566
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	Fill_Geo-21	490566
160-40590-4	HPPG-SFU-TU108A-002	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490768/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490768/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40590-4 DU	HPPG-SFU-TU108A-002	Total/NA	Solid	Fill_Geo-21	490566

Prep Batch: 490771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-5	HPPG-SFU-TU108A-003	Total/NA	Solid	Fill_Geo-21	490566
160-40590-6	HPPG-SFU-TU108A-004	Total/NA	Solid	Fill_Geo-21	490566
160-40590-7	HPPG-SFU-TU108A-005	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490771/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490771/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
 SDG: GJ46599766

Rad

Prep Batch: 490785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-8	HPPG-SFU-TU108A-006	Total/NA	Solid	Fill_Geo-21	490566
160-40590-9	HPPG-SFU-TU108A-007	Total/NA	Solid	Fill_Geo-21	490573
160-40590-10	HPPG-SFU-TU108A-008	Total/NA	Solid	Fill_Geo-21	490573
160-40590-11	HPPG-SFU-TU108A-009	Total/NA	Solid	Fill_Geo-21	490573
160-40590-12	HPPG-SFU-TU108A-010	Total/NA	Solid	Fill_Geo-21	490573
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	Fill_Geo-21	490573
160-40590-14	HPPG-SFU-TU108A-012	Total/NA	Solid	Fill_Geo-21	490573
160-40590-15	HPPG-SFU-TU108A-013	Total/NA	Solid	Fill_Geo-21	490573
160-40590-16	HPPG-SFU-TU108A-014	Total/NA	Solid	Fill_Geo-21	490573
160-40590-17	HPPG-SFU-TU108A-015	Total/NA	Solid	Fill_Geo-21	490573
MB 160-490785/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490785/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40590-17 DU	HPPG-SFU-TU108A-015	Total/NA	Solid	Fill_Geo-21	490573

Prep Batch: 490802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-18	HPPG-SFU-TU108A-016	Total/NA	Solid	Fill_Geo-21	490573
160-40590-19	HPPG-SFU-TU108A-017	Total/NA	Solid	Fill_Geo-21	490573
160-40590-20	HPPG-SFU-TU108A-018	Total/NA	Solid	Fill_Geo-21	490573
160-40590-21	HPPG-SFU-TU108A-019	Total/NA	Solid	Fill_Geo-21	490573
160-40590-22	HPPG-SFU-TU108A-020	Total/NA	Solid	Fill_Geo-21	490573
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	Fill_Geo-21	490573
160-40590-24	HPPG-SFU-TU108A-022	Total/NA	Solid	Fill_Geo-21	490573
160-40590-25	HPPG-SFU-TU108A-023	Total/NA	Solid	Fill_Geo-21	490573
160-40590-26	HPPG-SFU-TU108A-024	Total/NA	Solid	Fill_Geo-21	490573
160-40590-27	HPPG-SFU-TU108A-025	Total/NA	Solid	Fill_Geo-21	490573
MB 160-490802/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490802/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	DPS-7	490566
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	DPS-7	490573
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	DPS-7	490573
MB 160-490804/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490804/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1
SDG: GJ46599766

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr	Y				
		(40-110)	(40-110)				
160-40590-3	HPPG-SFU-TU108A-001	104	90.5				
160-40590-13	HPPG-SFU-TU108A-011	100	90.8				
160-40590-23	HPPG-SFU-TU108A-021	99.9	92.0				
LCS 160-490804/1-A	Lab Control Sample	80.9	93.8				
MB 160-490804/22-A	Method Blank	102	92.7				

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40593-1
Laboratory Sample Delivery Group: D1189452
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/12/2021 5:20:26 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Job ID: 160-40593-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40593-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
 SDG: D1189452

Job ID: 160-40593-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.1 C.

STRONTIUM-90 (GFPC)

Sample HPPG-SFU-TU108A-B-001 (160-40593-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 12/01/2020, prepared on 12/09/2020 and analyzed on 12/18/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU108A-B-001 (160-40593-1).

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU108A-B-001 (160-40593-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 12/01/2020, prepared on 12/03/2020 and analyzed on 12/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The replicate precision (RER) for Th-234/U-238 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances.
 (160-40595-A-5-C DU)

The method blank (MB) z-score associated with Prep Batch 160-490806 is within limits and is stored in the level IV raw data. (MB 160-490806/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
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Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-043

Project Number: 501197		Analysis Requested						Evidence Bag ID	Comment	
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action		Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)				Dose Rate uR/Hr			
Project Location: San Francisco, CA										
Purchase Order #: 1159058										
Shipment/Pickup Date: 11/25/2020										
Waybill Number: 4957 0225 6218										
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046										
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566										
Matrix	# of Containers	Preservatives (water)								
		Preservatives (soil)								
		Container Type								
Sample ID	Date	Time	Method							
HPPG-SFU-TU108A-B-001	11/23/2020	16:33	G	SO	1	16 oz. plastic jar	X	X	4	D1189452

Special Instructions: 21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:08	Locked Storage(Kevin Hoch)		11/23/2020 17:08
Locked Storage(Kevin Hoch)		11/25/2020 07:38	Devin Lewis		11/25/2020 07:38
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB		11/27/2020 09:12

*** Last 3 transfers shown above - Complete list of transfers on last page ***

MICHA KORRINHIZER

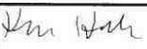
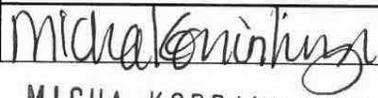


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All Transfers for COC 501197RSY-043

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:08	Locked Storage(Kevin Hoch)		11/23/2020 17:08
Locked Storage(Kevin Hoch)		11/25/2020 07:38	Devin Lewis		11/25/2020 07:38
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB		11/27/2020 09:12

MICHA KORRINHIZER



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40593-1

SDG Number: D1189452

Login Number: 40593**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Greer, Diane A**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40593-1	HPPG-SFU-TU108A-B-001	Solid	11/23/20 16:33	11/27/20 09:12	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
 SDG: D1189452

Client Sample ID: HPPG-SFU-TU108A-B-001

Lab Sample ID: 160-40593-1

Date Collected: 11/23/20 16:33

Matrix: Solid

Date Received: 11/27/20 09:12

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	-0.0276	U	0.139	0.139	0.331	0.117	pCi/g	12/09/20 18:42	12/18/20 20:18	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	88.4		40 - 110					12/09/20 18:42	12/18/20 20:18	1
Y Carrier	90.5		40 - 110					12/09/20 18:42	12/18/20 20:18	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Actinium-227	0.0611	U	0.223	0.223		0.286	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Bismuth-212	0.316	U	0.636	0.636		0.497	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Bismuth-214	0.354		0.108	0.114		0.0455	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Cesium-137	-0.0404	U	0.0682	0.0683	0.0700	0.0536	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-210	0.993		1.11	1.12		0.859	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-212	0.305		0.0674	0.0781		0.0326	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-214	0.271		0.0910	0.0953		0.0435	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Potassium-40	9.77		1.26	1.60		0.250	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Protactinium-231	0.000	U	0.211	0.211		1.77	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Protactinium-234	0.0231	U	0.0455	0.0456		0.190	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Radium-226	0.354		0.108	0.114	0.200	0.0455	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Radium-228	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thallium-208	0.125		0.0416	0.0436		0.0147	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium 228	0.305		0.0674	0.0781		0.0326	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium-232	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium-234	0.348	U	0.695	0.697		0.698	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Uranium-235	0.132	U	0.381	0.381		0.310	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Uranium-238	0.348	U	0.695	0.697		0.698	pCi/g	12/03/20 12:24	12/24/20 07:13	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
 SDG: D1189452

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-491323/23-A
Matrix: Solid
Analysis Batch: 492430

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491323

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.07392	U	0.140	0.140	0.331	0.108	pCi/g	12/09/20 18:42	12/18/20 20:20	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	100		40 - 110					12/09/20 18:42	12/18/20 20:20	1
Y Carrier	92.7		40 - 110					12/09/20 18:42	12/18/20 20:20	1

Lab Sample ID: LCS 160-491323/1-A
Matrix: Solid
Analysis Batch: 492430

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491323

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.76	5.897		0.638	0.331	0.109	pCi/g	76	75 - 125
Carrier	%Yield	Qualifier	Limits						
Sr Carrier	100		40 - 110						
Y Carrier	99.8		40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-490806/1-A
Matrix: Solid
Analysis Batch: 492974

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490806

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Actinium-227	0.04285	U	0.0714	0.0716		0.259	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Bismuth-212	-0.006457	U	0.333	0.333		0.273	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Bismuth-214	0.001033	U	0.000924	0.000930		0.141	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Cesium-137	0.01744	U	0.0296	0.0297	0.0700	0.0211	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-210	0.4198	U	0.929	0.931		0.732	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-212	0.0009085	U	0.0512	0.0512		0.0416	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-214	-0.02615	U	0.0747	0.0747		0.0630	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Potassium-40	0.3313		0.250	0.253		0.110	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Protactinium-231	0.0000	U	0.460	0.460		1.72	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Protactinium-234	0.03941	U	0.0812	0.0813		0.148	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Radium-226	0.001033	U	0.000924	0.000930	0.200	0.141	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Radium-228	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thallium-208	-0.03518	U	0.0689	0.0690		0.0361	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium 228	0.0009085	U	0.0512	0.0512		0.0416	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium-232	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium-234	0.0000	U	0.109	0.109		0.573	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Uranium-235	0.0000	U	0.112	0.112		0.240	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Uranium-238	0.0000	U	0.109	0.109		0.573	pCi/g	12/03/20 12:24	12/24/20 05:52	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
 SDG: D1189452

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490806/2-A
Matrix: Solid
Analysis Batch: 492975

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490806

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.4	102.3		10.7		0.361	pCi/g	106	87 - 116
Cesium-137	26.7	26.88		2.90	0.0700	0.0857	pCi/g	101	87 - 120
Cobalt-60	9.43	9.636		1.04		0.0186	pCi/g	102	87 - 115



QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Rad

Leach Batch: 490609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 490806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	Fill_Geo-21	490609
MB 160-490806/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490806/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 491323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	DPS-7	490609
MB 160-491323/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-491323/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Tracer/Carrier Summary

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Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1
SDG: D1189452

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40593-1	HPPG-SFU-TU108A-B-001	88.4	90.5
LCS 160-491323/1-A	Lab Control Sample	100	99.8
MB 160-491323/23-A	Method Blank	100	92.7

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

- 1
- 2
- 3
- 4
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- 6
- 7
- 8
- 9
- 10
- 11
- 12